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British Society for the History of Pharmacy
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Founded 1967

British Society for the History of Pharmacy

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The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

BSHP seeks to act as a focus for the development of all areas of the history of Pharmacy, from the works of the ancient apothecary to today's ever changing role of the community, hospital, wholesale or industrial pharmacist. Membership is open to all interested in the aims of BSHP.

Aims

Promotion of historical studies related to pharmacy.
Advancement of knowledge and propagation of understanding of the history of pharmacy.
Publication of the research work of pharmaceutical historians.
Preservation of pharmaceutical artefacts and historic pharmacies.
Support for the work of relevant museums and offering advice on establishment of other pharmaceutical exhibits and on the preservation of pharmacies.
Co-operation with related professions and local historians on medico-pharmaceutical topics of mutual interest.

Pharmaceutical Historian

The *Pharmaceutical Historian* has been published since 1967, at first intermittently, but on a regular quarterly basis from 1972. Issues generally comprise 16 or 20 pages and cover.

An **index** for the years 1967-1995 was published in 1998, for 1996-2000 in 2000, for 2001-2005 in December 2005 and for 2006-2010 in December 2010. They can be viewed on the website.

Papers, short communications and letters in English on any aspect of the history of pharmacy are welcome and should be sent to the address above or by email to *ainley.wade @easynet.co.uk*

Any illustrations are converted to monochrome for printing. Further details of requirements can be found on the website *www.bshp.org* under Publications.

Membership

Membership costs £20.00 per annum and includes:

Four issues of the *Pharmaceutical Historian.*

Regular meetings, with guest speakers, usually in October, November, February and May.

Visits to places of historic interest, museums, collections, botanical gardens, etc.

Annual Conference, usually in March/April.

Free use of the Royal Pharmaceutical Society of Great Britain's library facilities for research.

Help in historical research and with the identification of artefacts.

Affiliation to the International Society for the History of Pharmacy (ISHP).

Affiliation to the British Society for the History of Medicine (BSHM).

Application forms are available from the Honorary Secretary at the address above or on *www.bshp.org*

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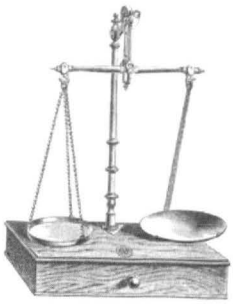

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Diary

Evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise stated.

Monday 12 May 2014
'The Apothecary in Medieval and Early Modern Society' by Dr Pat Cullum, Head of History, Huddersfield University. Lambeth, 5.30 pm.

Monday 7 July 2014
Visit to Royal Holloway University of London, Egham, Surrey TW20 0EX. Archives and picture gallery. Details later.

Monday 6 October 2014
'Galen' by Emeritus Professor Vivian Nutton, UCL Centre for the history of medicine. Lambeth, 5.30 pm.

Wednesday 12 November 2014
'Nicholas Culpeper' by Dr Barry Strickland-Hodge. Joint meeting at Aston University, Birmingham.

Theft from RPS Museum November 2013

BSHP President Briony Hudson and Honorary Secretary Peter Homan attended a meeting on 20th January 2014 to discuss issues arising from the recent theft from the Royal Pharmaceutical Society Museum. Martin Astbury, RPS President, chaired the discussion. Also present were Helen Gordon, RPS Chief Executive, Simon Redman, Director of Finance and Resources, Catherine Duggan, Director of Professional Development and Support, Ruth Wakeman, Head of Professional Support, Neal Patel, Head of Corporate Communications, and John Betts, Keeper of the Museum Collections and BSHP Committee member.

It was confirmed that the investigation into the incident is still ongoing and active, and that additional security measures have been put into place in response to immediate issues raised. The discussion particularly focussed around lessons to be learnt that could inform the plans currently being made for the new RPS headquarters near Tower Bridge. The President also thanked BSHP for its ongoing support for the Museum.

Burnby Memorial Bursary 2014

The bursary for 2014 was awarded to Elizabeth Nally, a 5th year medical student at Imperial College London for a paper on 'Itching for a Solution: making topical steroids a standard treatment for eczema'. The paper will be presented at the 2014 Annual Spring Conference in Birmingham.

The bursary was awarded from a fund in memory of Dr Juanita Burnby, former history researcher, president of BSHP and editor of the *Pharmaceutical Historian.*

Edward Joseph Shellard – A Phenomenal Pharmacognosist: Part 2

Peter J Houghton[1] and J David Phillipson[2]

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[2] Centre for Pharmacognosy and Phytotherapy, Department of Pharmaceutical and Biological Chemistry, UCL School of Pharmacy, 29-39 Brunswick Square, London WC1N 1AX

An outline of Joe Shellard's career has been presented in Part 1[1]. He joined the School of Pharmacy, Merchant Venturers Technical College, later the College of Technology, Bristol, as a lecturer in 1946. In 1957 he was appointed as a lecturer in Pharmacognosy at the Department of Pharmacy, Chelsea College, London, and he retired in 1978. During his time at Chelsea he was promoted to Senior Lecturer, then Reader and finally Professor in 1970. When he retired he was Assistant Head of the Pharmacy Department at Chelsea College. In Part 2 we present some of the contributions that he made to Pharmacognosy and Pharmacy, including his research into the alkaloids of *Mitragyna* species, his role as an External Examiner, his overseas connections and visits, his presentations to pharmaceutical and scientific conferences, his committee work, his respect for his teacher Dr Tommy Wallis and his activities in retirement.

Mitragyna Alkaloids

Joe Shellard's main area of research in the 17 years from 1961-1978 was concerned with the alkaloids of *Mitragyna* species (Rubiaceae). Nearly 100 original research papers and review articles were published and lectures presented dealing with some 43 alkaloids isolated from 10 species[2-6]. The question that must be asked is, why *Mitragyna*? His interest was aroused whilst he was at the Bristol School of Pharmacy prior to his Chelsea College days. Arthur Hereward Millard, Director of the Botanic Gardens, Kuala Lumpur, Malaya, was a former member of staff when the School was at Bath and he knew Joe. In 1959 when he visited Chelsea College he told Joe about the use of the leaves of the tree *Mitragyna speciosa* Korth. as an opium substitute.

In 1960 Arnold Beckett returned from Kumasi in Ghana with a supply of leaves that contained alkaloids. He arranged for Albert Tackie, a lecturer from the School of Pharmacy, Kwame Nkrumah University, Kumasi, to work on these leaves under his supervision for the degree of PhD. Joe took samples of this plant material to the Herbarium, Royal Botanic Gardens Kew, where they were identified as *Mitragyna stipulosa* (DC) O.Kuntze. Previous investigations had been made by other researchers into the alkaloids of *Mitragyna speciosa* known as 'biak biak' in Malaya and 'kratom' in Thailand. Joe discovered that Albert Tackie was also working on *Mitragyna speciosa* and that this plant material had been sent to him by his friend AH Millard, but had been delivered to Arnold Beckett. Smith, Kline and French, the US pharmaceutical company were interested in this species and they were also financing some of Arnold Beckett's research. SKF discovered that the major alkaloid mitragynine had analgesic activity similar to codeine but further investigation revealed toxicity in animal tests. When SKF had no further interest in *Mitragyna* alkaloids they allowed Arnold Beckett to publish a paper on the alkaloids of *Mitragyna speciosa* with Joe Shellard as co-author[7]. When AH Millard learned this he was most upset because he had previous bad experience with scientists from SKF.

Beckett, Shellard and Tackie presented their early results on the alkaloids of *Mitragyna stipulosa* at the British Pharmaceutical Conference in 1963.[8] David Phillipson commenced research on the alkaloids of *Mitragyna parvifolia* (Roxb.) Korth. from India and *Mitragyna rotundifolia* (Roxb.) O Kuntze from Burma in 1961 under the supervision of Joe Shellard. Their early results were presented at the 23rd Congress of Pharmaceutical Sciences of FIP held in Munster, Germany, in 1963.[9,10]

When the *Mitragyna* research commenced progress was limited because of the lack of chromatographic separation of the constituent alkaloids. Joe obtained a novel kit for spreading thin layers of adsorbents such as silica gel or alumina on to glass plates. This novel technique of thin layer chromatography (TLC) not only enabled Tackie and Phillipson to separate the alkaloids rotundifoline and rhynchophylline, which had been previously isolated by crystallisation, but also to demonstrate that crude extracts contained complex mixtures of at least 12 different alkaloids. This technique was used to separate other alkaloids and had a dramatic effect on the progress of the research. Within a few years gas liquid chromatography (GLC) and high performance liquid chromatography (HPLC) also became available for further separations to be made. The process of determining the chemical structures was greatly aided by the evolution of physico-chemical analytical techniques including nuclear magnetic resonance spectrometry (NMR) and mass spectrometry (MS). The combination of these techniques led to the isolation, characterisation and determination of the chemical structures of a whole series of novel alkaloids. SKF donated mitragynine mother liquors in kilogram quantities, which provided a useful source of many alkaloids. The *Mitragyna* research group expanded particularly with Payom Tantivatana and Dhavadee Ponglux from Thailand, who both subsequently became professors at Chulalongkorn University, Bangkok, and postdoctoral workers such as Calvin Lee and Bill Trager from the USA.

As the research continued a whole series of closely related indole alkaloids with heteroyohimbine and oxindole structures were isolated and the focus of the investigation turned to studies of their configurational and conformational structures. When Peter Houghton joined the group he also registered for a PhD under Joe's supervision. He discovered that in some species the young leaves contained heteroyohimbine alkaloids which were absent from the mature leaves. This led to speculation about the biosynthetic pathways involved in the formation of these alkaloids. Studies on the alkaloids of *Mitragyna parvifolia* leaves, stem bark and root bark collected

monthly over a 12 month period led to a hypothesis about the pathways involved, and radioactive feeding experiments indicated that the heteroyohimbines were the precursors of the oxindoles. Although research on *Mitragyna* alkaloids has now ceased at Kings College London (Chelsea College was merged with Kings College London in 1984) there is still interest in the UK because the leaves of *Mitragyna speciosa* are available for 'recreational' purposes giving rise to concern about health risks to users.

External Examiner in Pharmacognosy

In 1953, while at Bristol, Joe was appointed as an Examiner in Pharmacognosy by the Pharmaceutical Society of Great Britain and this added to his status as a teacher of Pharmacognosy. Several years later he became Chairman of the Board of Examiners in Pharmacognosy for the Pharmaceutical Society and this brought him into collaboration with CW Maplethorpe who chaired the Society's Education Committee. They made changes to the Pharmacognosy syllabus, cutting down on the botanical aspects of medicinal plants and introducing chemistry. Joe was able to visit his former colleagues at Bristol as an external examiner. As the years passed he acted as an external examiner to a number of Schools of Pharmacy in the UK including Bath, Bradford, Brighton, Bristol, Cardiff, Manchester, Nottingham and Sunderland. These duties added to his busy schedule, particularly in the June-July period when he would frequently have to visit more than one School.

As he became more and more recognised as a teacher and a researcher he became external examiner to a number of overseas universities including Dublin (Eire), Kumasi (Ghana), Ibadan and Ile Ife (Nigeria), Khartoum (Sudan), and Dar-es-Salaam (Tanzania). During all of these visits he strove to improve the Pharmacognosy syllabus and encouraged university staff in their teaching and research. He also helped by suggesting the names of potential visiting staff as well as inviting individuals to spend some time at the Department of Pharmacy, Chelsea College. As examples, whilst at Kumasi, Ghana, in 1961 he suggested that Dr Talalaj from Warsaw be appointed as a temporary lecturer to improve teaching and research in Pharmacognosy. He also took the opportunity to collect samples of *Mitragyna* leaves for research. In 1971 he was at Ibadan, Nigeria, and when he arrived he was informed that Professor Said, Head of the School of Pharmacy, had been killed in a road accident and, as no examination papers had been set, Joe had to set theory and practical examination papers. The School was short-staffed and he arranged for his Chelsea colleagues Dr Georgina Jolliffe and her husband Dr Geoffrey Jolliffe, a physical chemist, to be seconded to the Ibadan School of Pharmacy for a period of 3-6 months.

Overseas visits

In 1957 Joe had met Dr Bogdan Karminski, a lecturer in Pharmacognosy at the Faculty of Pharmacy, Warsaw, Poland, while he was visiting the School of Pharmacy, Brunswick Square, London, and they became firm friends. Joe was interested in Pharmacognosy teaching and research in Poland and he learned about their use of medicinal plants. Joe invited Dr Karminski to Bristol where he was attending a special dinner arranged to thank Joe and Sylvia for their efforts on behalf of the British Pharmaceutical Conference held at Bristol in 1957.

In 1959 he received an invitation from Professor Deryng, via Dr Karminski, to spend a month in the Pharmacognosy Department, Faculty of Pharmacy, Warsaw. The Faculty was in a new building and all of the Pharmacognosy staff was active in teaching and research. They were in the process of preparing a *Microscopical Atlas of Crude Drugs* based on camera lucida drawings. This was the first such atlas to be prepared since the one produced in Germany by Professor Koch in 1906. The Pharmacognosy laboratories were all fitted out for microscopical and chemical work and each member of staff had their own office and was engaged in phytochemical research. Joe visited Dr Lutomski, director of the Medicinal Plant Research Institute at Poznan and Herbapol where there were plantations of medicinal plants specially cultivated for their high quality and yield. At this time there was no pharmaceutical industry in Poland and synthetic medicinal drugs were not readily available. The contrast to Britain was considerable and Joe was inspired to fight for Pharmacognosy as an important subject in the UK.

Ten years later he returned to Poland where he gave a series of research lectures at Warsaw, Poznan and Krakow. In 1970 he was elected as an Honorary Member of the Polish Pharmaceutical Society and his certificate was presented by the Polish Ambassador at the London Embassy. Mr WM Darling, President of our Pharmaceutical Society and Mr DF Lewis, Secretary and Registrar, were present as guests. Also present at this glittering occasion was one of the authors of this article (JDP) and his wife. Never before, or since, have they seen so much alcohol presented for consumption. An international symposium 'Progress in the Field of Plant Drugs' was held at Poznan in 1970 and Joe gave a plenary lecture entitled 'Present and future trends in the scientific study of plants throughout the world'. The Slovakia Pharmaceutical Society held a symposium on Pharmaceutical Analysis in the same year and Joe was an invited speaker. He presented other research lectures in a number of Eastern European countries including Bucharest (Romania), Sofia (Bulgaria) and Budapest (Hungary).

In 1975, Joe was invited to visit the office of the Polish Cultural Attache in London and was faced with a series of questions about his relationship with the Warsaw Medical Academy. It subsequently became apparent that he was being awarded a Doctorate honoris causae. The honorary degree was conferred in Warsaw in June 1975. His contribution to teaching and research in Pharmacognosy in Eastern Europe was also recognised by him being made an Honorary Member of the Pharmaceutical Societies of Bulgaria, Hungary and Poland.

His use of TLC for the separation of the constituents of medicinal plants brought him into contact with Professor Egon Stahl of Saarbrucken University and Joe gave

several lectures at Saarbrucken. As his reputation grew he received invitations to lecture in a number of European countries including Belgium, France, Germany, Hungary, Italy, Netherlands, Norway, Spain, Sweden and Switzerland. Inevitably invitations to lecture came from even further abroad including Egypt, Turkey, Iraq, India, Sri Lanka, Malaysia, Singapore and Thailand. Wherever he went he made strong links and invited many scientists to visit him at Chelsea College.

Conference presentations

Joe went to many pharmaceutical conferences, including the British Pharmaceutical Conferences and congresses of FIP, and as the *Mitragyna* research progressed he frequently contributed scientific papers. His inclination was to prefer FIP because there was more interest in Pharmacognosy. He was often accompanied by Dougie Harrod and the venues included Austria, Czechoslovakia, France, Germany, Netherlands, Poland and Sweden. He organised a botanical excursion for the Medicinal Plants Section at a London FIP Congress. They visited Burnham Beeches and had a reception held by the Lord Mayor of Oxford. The day concluded with a dinner at Chelsea College. In 1976 he was elected as the Vice President of the Medicinal Plants Section of FIP and he was the President from 1980 to 1984.

He gave lectures at the majority of the UK Schools of Pharmacy and to local branches of the Pharmaceutical Society. By the time that he retired he had given more than 50 local branch lectures. There were also meetings of Pharmacy teachers and Pharmacy students where he lectured and he always took an active part in their discussions. In addition he was invited to lecture to other scientific groups including the Society for Analytical Chemistry, Society for Chemical Industry, Phytochemical Society, National Council for Careers for Women,[11] Osteopaths, and Naturopaths. He also organised several of his own symposia on the application of chromatographic techniques and in 1967 he was invited to submit an article to the prestigious scientific journal *Nature*[12]. As an active member and also one time chairman of the Hounslow Branch of the Pharmaceutical Society he was at the centre of all of their activities. When Parke-Davis was based at Hounslow he had the opportunity to meet with industrial colleagues and he persuaded the company to donate an annual prize for the best student specialising in Pharmacognosy at Chelsea College. In 1966 he was invited to give the annual Parke-Davis lecture to the Hounslow Branch.

A Committee Man

Joe was a member of many committees throughout his academic career and he was a powerful advocate for those matters that he supported. He was a formidable opponent in any debate. In 1953 he was an active member of the Association of Teachers in Technical Institutes (ATTI) at Bristol and he became chairman of the local ATTI at Chelsea College. He was active in 1965 at the joint discussions between the ATTI and the AUT when Chelsea College was changing from a Technical College to university status.

By 1960 he was recognised as a teacher and researcher in Pharmacognosy and this led to him joining the Pharmacognosy Committee of the Pharmaceutical Society and also the British Pharmaceutical Codex Revision Committee. He prepared detailed memoranda on the Pharmacognosy syllabus for CW Maplethorpe, chairman of the Education Committee of the Pharmaceutical Society and this led to the formation of a small committee of pharmacognosists including Bill Court, Ken Fell, Frank Fish, and Betty Jackson , with Joe as chairman. They reorganised the Pharmacognosy syllabus for the BPharm degree and included phytochemistry and chromatography. They also prepared a booklet on the identification of powdered plant drugs to help undergraduates in their practical examinations and this cut down the amount of memory required on their characteristic features.

The Medicines Control Agency (MCA) was established by the government under the Medicines Act 1968 and the wording of the Act appeared to put an end to the practising of Herbal Medicine. Pressure was exerted by members of both Houses of Parliament and Mr A Chamings was invited to set up a group of experts to advise the MCA on medicinal plants. Joe became a member of this committee that also included Mr F Fletcher Hyde, President of the National Institute of Medical Herbalists (NIMH), and professors Jim Fairbairn and JM Rowson. The committee met many times during the 1970s until a report was prepared recommending that a Herbal Products Advisory Committee be established. Mr Chamings proposed that the British Herbal Medicines Association (BHMA) should prepare a British Herbal Pharmacopoeia (BHP) that would lay down standards for medicinal plants. Joe became heavily involved in the preparation of the BHP which came out in several parts until a complete volume was published in 1983.[13] A fully revised version and a Compendium was published in 1992.[14,15] He also organised several short courses to train those interested in evaluating herbal material.

Joe was also active in committees of the University of London and was chairman of the Board of Studies in Pharmacy and of the Higher Degrees Committee. At Chelsea he chaired the Refectory Committee and this required treading a careful line between the students' demands for cheap meals and the need for the refectory to break even in its finances. In turn this led to him being appointed to the College Finance Committee, a move that helped to reorganise the allocation of funding within the Department of Pharmacy.

Dr TE Wallis

Joe always held Dr TE (Tommy) Wallis, his Pharmacognosy teacher 1934-6, in the highest regard. In his early days at Bristol when he prepared his first research paper, it was Tommy Wallis that helped him to redraft his manuscript and to submit it for publication. Tommy also helped him in his early research at Chelsea and was one of his examiners for the degree of PhD. Joe organised a function at Chelsea College to mark the occasion of Tommy's 85th birthday in December 1961. Pharmacognosists from many of the UK Schools of Pharmacy came for a birthday lunch and contributed to the

Figure 1. British pharmacognosists presenting a television set to Tommy Wallis on the occasion of his 90th birthday, 1966.

presentation of a silver salver, a 5 year diary and an autograph album signed by those present. Five years later the celebrations were continued and Tommy was given a TV set. On this occasion Tommy gave a lecture, complete with slides, to staff, students and guests from other Schools of Pharmacy. Joe organised a further party for Tommy's 95th birthday and after lunch Tommy was presented with an armchair from British Pharmacognosists. He died, aged 96, in March 1973, and two of his former students, Professors Jim Fairbairn and Joe Shellard, read eulogies at the funeral service. Joe also submitted obituaries to the *Pharmaceutical Journal, Chemist and Druggist* and *Chemistry in Britain* (Figures 1,2).

Retirement

Joe retired in 1978 but continued to be busy throughout his final year. He took an active part in the Pharmacy Lecturers Conference at Brighton Polytechnic. He was involved in the appointment of Dr Michael Newton as the new Professor of Pharmaceutics and persuaded Norman Bisset to take over as Assistant Head of the Chelsea College Department of Pharmacy. He gave two special lectures to 3rd year BPharm students at the School of Pharmacy, Brunswick Square. His term as External Examiner at the University of Bath ended and at a special dinner his former colleague, DA Norton, made a presentation to him. In June he went again to Nairobi as an External Examiner.

The Principal of Chelsea College, Professor David Ingram and his wife invited Joe and Sylvia to their home for a special dinner in July. On the 24th of July there was a presentation ceremony for Joe at the College. Speeches and presentations were made by the Principal, Dr Georgina Jolliffe and Cyril Maplethorpe, chairman of the

Figure 2. Joe Shellard and Tommy Wallis on the occasion of his 90th birthday, 1966.

Figure 3. Joe Shellard receiving a retirement gift from Dr Georgina Jolliffe, Dr Peter Hylands, Dr Peter Houghton, and Professor Norman Bisset, 1978.

Education Committee of the Pharmaceutical Society. On the following day he was the guest of the Pharmacy Students Association. The week ended with a lunch with his Pharmacognosy colleagues (Figure 3).

In September he and Mr Harrod attended the FIP Congress at Cannes and made a special excursion to La Mortola, the Hanbury Botanical Garden in Ventimiglia, Italy. He donated all of his scientific books to the Faculty of Pharmacy, Hanoi, Vietnam.

His last day at Chelsea College was 30th September, 1978. Among the many tributes made to him was one that brought tears to his eyes. It was written by his colleague Professor Bill Hunter, head of Pharmaceutical Chemistry and this small excerpt is pertinent:

> He took over a small, traditionally orientated Pharmacognosy Department and in 21 years transformed it to one of the best equipped and well known in the country. In the process he himself was to become known throughout the pharmaceutical world as one of the most famous and respected personalities. No scientific subject could have wished for a more devoted or more passionate champion, whether lecturing on his own research or arguing with characteristic fervour for material or financial support … All of this does not add up to what I have called the unique Shellard style. The only comparison I can make is to Aneurin Bevan, the oratory, the lapses into his native accent, the flashing eye, the ready wit, the courage and denunciation of cant or hypocrisy, all these we shall lose and our communal life will be the poorer for it. We shall miss his tireless efforts on our behalf, his ability to stimulate and to infuriate his colleagues. Above all we shall miss his understanding and appreciation of the real issues that are often buried beneath layers of circumstance and expediency.

Figure 4. Georgina Jolliffe presenting Joe Shellard with a picture of a cricket match, his favourite sport, on his 80th birthday, 1993.

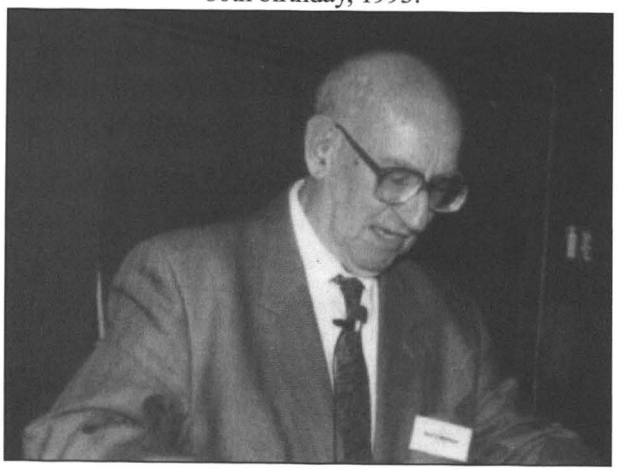

Figure 5. Joe Shellard giving a lecture in tribute to Dave Phillipson on his retirement at The School of Pharmacy, University of London, 1994.

After such a busy career it would not have been surprising to learn that Joe Shellard relaxed into an easier lifestyle. Nothing could be further from the truth. He wrote a series of articles entitled 'A History of British Pharmacognosy, 1842-1980' for the *Pharmaceutical Journal,*[16] also collected into a soft backed format as a private publication[17] with a foreword by Desmond Lewis, former Secretary and Registrar of the Pharmaceutical Society of Great Britain. There are nine separate articles and they include accounts of the Materia Medica Museum and Herbarium of the Pharmaceutical Society, the life and work of Jonathan Pereira, Daniel Hanbury, EM Holmes, Henry George Greenish, and TE Wallis. He also took up painting each morning and many of his colleagues and friends have been delighted to receive one of his pictures.

When he had been retired for nine years he was invited by Professor Lutomski, Director of the Institute of Medicinal Plants, Poznan, to present a lecture at their 40th anniversary celebrations in 1987. Years previously in 1970 he had given a lecture at their international symposium entitled 'Research on Medicinal Plants throughout the World' and a paper 'Present and future trends in research in medicinal plants and crude drugs in Great Britain' was published in *Herba Polonica.*[18]. In his 1987 lecture he summarised the research taking place in British Schools of Pharmacy by pharmacognosists including NG Bisset, G Blunden, FJ Evans, PJ Houghton, PJ Hylands, JD Phillipson and MF Roberts. Although he had been retired for 9 years he still kept a keen interest in the research of British pharmacognosists. A lunch at Kings College London to celebrate Joe's 90th birthday in 2003 was organised by Professor Bob Hider, Head of School of Biomedical and Health Science. Tributes were paid to him by three of his former colleagues and although he claimed that he had not prepared a speech, he entertained the assembled guests with his usual great humour. Joe never lost interest in his favourite subject, Pharmacognosy, or in his fellow pharmacognosists (Figures 4,5) and he died on the 10th June 2010 aged 96.

Endnotes and References

1. Houghton, PJ, Phillipson, JD. Edward Joseph Shellard – a phenomenal pharmacognosist: Part 1. *Pharmaceutical Historian* 2013; 43 (3): 73-80.
2. Shellard, EJ. The genus *Mitragyna*. *Pharmaceutisch Weekblad* 1971; 106: 224-236.
3. Shellard, EJ. Alkaloids from species of *Mitragyna*. *Anales De Quimica-International Edition* 1972; 68: 937-946.
4. Shellard, EJ. Alkaloids of *Mitragyna* with special reference to those of *Mitragyna speciosa*, Korth. *Bulletin of Narcotics* 1974; 26: 41-55.
5. Shellard, EJ. *Mitragyna* - A note on the alkaloids of African species. *Journal of Ethnopharmacology* 1983; 8: 345-347.

6. Shellard, EJ. Ethnopharmacology of kratom and the *Mitragyna* alkaloids. *Journal of Ethnopharmacology* 1989; 25: 123-124.
7. Beckett, AH, Shellard, EJ, Phillipson, JD, Lee, CM. Alkaloids from *Mitragyna speciosa* Korth. *Journal of Pharmacy and Pharmacology* 1965; 17: 753-755.
8. Beckett, AH, Shellard, EJ, Tackie, AN. *Mitragyna* species of Ghana - Alkaloids of leaves of *Mitragyma stipulosa* (D.C.) Kuntze. *Journal of Pharmacy and Pharmacology* 1963; 15: 158T-165T.
9. Shellard, EJ, Phillipson, JD. The alkaloids of the leaves of *Mitragyna rotundifolia* (Roxb.) O. Kuntze and of *Mitragyna parvifolia (Roxb.) Korth.* Presented at the 23rd Congress of Pharmaceutical Sciences of FIP, Munster, Germany, September 1963.
10. Shellard, EJ, Phillipson.JD. Thin-layer chromatography of some *Mitragyna* alkaloids. Presented at the 23rd Congress of Pharmaceutical Sciences of FIP, Munster, Germany, September 1963.
11. Shellard, EJ. Some early women research workers in British Pharmacy. *Pharmaceutical Historian* 1982; 12: 2-3.
12. Shellard, EJ. Thin layer chromatography. *Nature* 1967; 216: 1168-1170.
13. *British Herbal Pharmacopoeia* 1983. Bournemouth: BHMA.
14. *British Herbal Pharmacopoeia* 1992. Bournemouth: BHMA.
15. *British Herbal Pharmacopoeia Compendium* 1992. Bournemouth: BHMA: 239.
16. Shellard, EJ. A history of British Pharmacognosy 1842-1980, a series in the *Pharmaceutical Journal*:
Preface and introduction. 1980; 225: 680-683.
Part 1. The long beginning. 1842-1890. 1981; 226: 108-111.
Part 2. The halcyon days 1890-1950. 1981; 226: 189-196.
Part 3. The unfortunate phoenix. 1950-1980. 1981; 226: 406-414.
Part 4. The materia medica museum and herbaria of the Pharmaceutical Society. 1981; 227: 201-209.
Part 5. The life and work of Joanathan Pereira. 1804-1853. 1981; 227: 631-633.
Part 6. The life and work of Daniel Hanbury 1825-1875. 1981; 227: 774-777.
Part 7. The life and work of EM Holmes 1843-1930. 1982; 228: 78-84.
Part 8. The life and work of Henry George Greenish. 1855-1933. 1982; 228: 371-374.
Part 9. The life and work of TE Wallis 1876-1973. 1982; 228: 536- 540.
17. Shellard, EJ. *A history of British Pharmacognosy* 1842-1980. Private publication of ref. 31 above with additional information in a foreword and appendices containing examination questions 1842-1978, list of Pharmacognosy teachers 1919-1980 and pharmacognosists on BP and BPC committees.
18. Shellard, EJ. Recent research in medicinal plants in Great Britain. *Herba Polonica* 1987; 33:271-274.

The relationship between the expeditions of the Heroic Age of Antarctic Exploration and drug companies

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The main supplier of drugs and medical equipment to the British and Australian Antarctic expeditions of the Heroic Age was Burroughs Wellcome and Co (BW&Co). This paper discusses the relationships between the expeditions of Scott and Shackleton and BW&Co and also discusses some of the other companies that supplied drugs or used the names of the expeditions in their advertising.

Introduction

The main supplier of drugs and medical equipment to both of Robert Scott's and all three of Ernest Shackleton's Antarctic expeditions was Burroughs Wellcome and Co (BW&Co). They also supplied the Scottish and Australian expeditions, Roald Amundsen, the *Southern Cross* expedition, the *Morning* (the ship that relieved the *Discovery* in 1903 and 1904) and expeditions to many other places including the Arctic, Africa and Mount Everest.

The drugs themselves and the types of medicine chests and cases supplied are described in previous papers in this series.

From the founding of its business, BW&Co had 'made a special feature of studying medical and surgical requirements for expeditions to tropic and arctic and other trying climates, especially for the use of explorers, journalists and other travellers…'[1] and they supplied these drugs and other medical equipment in their medicine chests and cases. These medicine chests became established as emblematic of the company[2] and the expeditions that used their cases were much quoted in BW&Co's advertising literature. This paper discusses the relationships between BW&Co and the expeditions.

BW&Co's medical cases for travellers

While the concept of a medicine chest was by no means new, BW&Co's formulation of drugs in tablets and compressed bandages meant that their chests were more compact than previous ones. The idea of the chest seems to have been Silas Burroughs':

> These cases … would I believe be the means of introducing our goods more acceptably[,] rapidly & profitably to the medical profession & public, and at the same time with less expense to ourselves than any other means. Every chemist would be willing to keep one of each sort of case on his counter together with copies of the books for sale. Such a case in [the] hands of each doctor & chemist … would spread our goods over the world in a hurry greatly to our credit & profit.[2]

BW&Co's interest in travel and the traveller's medical chest has, I believe, several elements. Firstly Sir Henry Wellcome was personally interested in travel and had travelled to Ecuador, where he searched for cinchona,

and Sudan and he had a personal friendship with the explorer, Henry Morton Stanley. He also saw the benefits of travel for his business:

Exploration had the potential to open up more markets for their products and, outside medicine, he noted that 'many of the most invaluable discoveries came as by-products of an explorer's achievement', for example the northern whale fishery was discovered during a search for the North West Passage.[3] Explorers also assisted him in building his collection of medical objects.[4]

Others have reached different conclusions. Commercial opportunities were, of course, greater in the colonies rather than the Antarctic and comments such as 'the medicine chest goes hand in hand with the advance of civilisation. The conquest of disease and the battle against ignorance and superstition are fought along the same frontiers[5] have been used to paint the extreme view that marketing medicine chests to travellers to the tropics was 'to preserve white European bodies against the vagaries of a highly racialized tropical climate' and was 'scientific racism' by upholding 'the western belief in a hierarchy of civilizations, with the west – particularly Britain – at the summit.'[6]

Lastly, of course, he used these connections with explorers for advertising.

Use of the expeditions in BW&Co advertising

Many of the expedition medical chests and cases were lent and, on their return, became part of the Wellcome Collection. These 'were featured as tools of travel and exploration within company brochures and through their display at international trade fairs. The objects therefore became part of campaigns to build and advertise BW&Co as a global company'[4] and Johnson says that 'the chests eventually became as famous as the explorers who used them, going on tour, with their own history and stories of adventure.'[6]

Another of Sir Henry Wellcome's interests was the history of medicine and BW&Co produced a number of small books which combined brief histories of medical topics with advertising of their products to the medical profession.

At least five of these[7,8,9,10,11] described the medicine chests supplied to Antarctic, Arctic and other expeditions and included testimonials from the explorers and their doctors. From the *Discovery* Expedition, Dr Edward Wilson wrote:

> Though there was but little serious illness on the '*Discovery*' during the recent Antarctic expedition, the 'Tabloid' preparations and the cases were put to a fairly rigorous test, not only in the ship but on the various sledge journeys that were undertaken during which they experienced temperatures as low as 68°F below zero, and much rough handling, without any loss of efficiency and usefulness. Certain of the 'Tabloid' Ophthalmics were freely used for snow blindness, and were found to be most convenient.

Sir Clements Markham (president of the Royal Geographical Society) and Drs Reginald Koettlitz and George Davidson (medical officer to the relief ship '*Morning*') also provided testimonials, as did Ernest Shackleton and Dr Eric Marshall from the *Nimrod* expedition.[7] From later expeditions testimonials were provided by Roald Amundsen, Ernest Shackleton (from the ITAE), Frank Wild (*Quest* expedition)[12] and the doctors of the *Terra Nova* expedition.[13] They continued to support arctic and Antarctic exploration and also used a testimonial from Richard Byrd[12] who led five US expeditions between 1928 and 1956.

BW&Co also used their Antarctic connection in advertising their products to non-medical travellers[14] (Figs 1 and 2).


TRADE MARK 'TABLOID' BRAND

Medical Equipments

have been supplied to every important expedition of recent years, including the Stanley, Nansen, Peary, Jackson, National Antarctic, and Scottish National Antarctic Expeditions, and were extensively used in the South African and other campaigns.

No. 250. 'TABLOID' Brand MEDICINE CHEST. Made of japanned sheet iron. Outside measurements, 15¾ × 12½ × 8¾. Weight of chest when fitted, about 40 lb.

The chest illustrated above is invaluable for caravan work and base depôts, being compact, complete and portable. The contents are unaffected by heat, cold or damp and are always ready for instant use. Cases to suit all requirements in any part of the world are issued in a variety of sizes.

Estimates given or illustrated list and full particulars sent on request.

BURROUGHS WELLCOME AND CO., LONDON, SYDNEY, CAPE TOWN

[COPYRIGHT]

Ex 48

[*To face last p. of matter.*

Figure 1. Advertisement in Royal Geographical Society. *Hints to Travellers Scientific and General: vol 2*. London: Royal Geographical Society, 1906: vii (ref. 14).

Arrangements with expeditions

The benefits of this were not, of course, one-sided as expeditions look to companies of all sorts to provide food, equipment and medical supplies cheaply or even for free.

Church says that one of the things that differentiated BW&Co from other drug companies was their marketing and actively seeking orders from doctors and pharmacists, rather than waiting for orders to arrive[15] and they were certainly pro-active in approaching explorers to provide the drugs and equipment for expeditions. A report (presumably to a superior within the company)

Figure 2. Advertisement for Burroughs Wellcome showing various situations in which a Tabloid medicine chest would be useful.
Reproduced by permission of the Wellcome Trust.

shows that the day after the announcement of the *Endurance* expedition, BW&Co approached Shackleton:

> Following the announcement in the 'Daily' papers of 30th December 1913, I ... interviewed Sir Ernest Shackleton ... respecting the order for his medical supplies.

Shackleton obviously wanted to use BW&Co's products but also realised that BW&Co needed his custom as the report continues:

> Sir Ernest immediately asked if we were going to give the medical equipment to him – I said I had not come prepared with an answer to that request, but presumed he would be willing to entrust his equipment with us on the same condition as before ... [ie supply] the entire medical equipment at cost ... Sir Ernest said ... "I know who to go to for the various items of my equipment when the time arrives and Burroughs Wellcome & Co. for medical supplies is a household word", but as he is requiring further funds he is looking forward for most of his equipment being supplied gratis.[16]

The final agreement was set out in a letter to Frank Wild, Shackleton's deputy:

> We understand that you will kindly regard our firm as the sole suppliers of your medical equipment. In view of this we shall have great pleasure in loaning to you free of charge, a regulation case of surgical instruments, and also a specially designed Aluminium Outfit for the party who are making the march from the Weddell to the Ross Seas (It being understood that you will be kind enough to return these two cases to us on your return to England for our Historical Museum); that you will let us have a report on the medical equipment signed by yourself; and that if you write a book upon the Expedition you will be good enough to mention that we were the sole suppliers of the medical section of your equipment, in return for which we will supply the balance of the surgical and medical equipments packed in convenient size portable cases, at cost.[17]

I have not found the agreements with the other expeditions but the letter above implies that the agreement for the *Endurance* expedition was going to be the same as that for *Nimrod*. The arrangements for Scott's *Terra Nova* expedition were similar, as there is a letter from BW&Co emphasising: 'We draw to your attention the fact that it is the entire medical equipment, and all the photographic chemicals'[18] and a letter from the company to Henry Wellcome that states that Scott 'has accepted our offer [to supply the complete medical equipment] on the conditions proposed, namely that we are the only firm to supply his medical and surgical equipment ...'[18] As further evidence of Sir Henry Wellcome's interest in the expeditions, he also made a personal donation of 200 guineas (£210) towards this expedition.[19] They also supplied photographic equipment, veterinary drugs and chemicals for Dr Atkinson's bacteriology, protozoology and helminthology and they supplied veterinary drugs to the Australian expedition.

When William Spiers Bruce (the leader of the Scottish expedition) was planning a second Antarctic expedition for 1912 (which never happened), BW&Co wrote to him saying: 'we trust that if you decide upon leading an Expedition to the Antarctic regions you will not forget our application to be allowed to supply your medical equipment.'[20]

The company also made an unplanned contribution to Shackleton's ITAE. Shackleton left England in August 1914 with many unpaid bills and in December of that year BW&Co were chasing an unpaid bill of £235.18s.0d.[21] Shackleton's solicitors replied that due to the start of the First World War, 'a considerable sum of money which had been promised ... was not forthcoming [and that] the funds at present ... do not permit [them] to meet liabilities in full.'[22] £63.13s.6d was paid in July 1915[23] and eventually, once news of Shackleton's shipwreck and rescue reached England, the remainder of the bill was written off.[24]

BW&Co imply that they 'hedged their bets' over the Scott-Amundsen race to the South Pole writing: 'incidentally, both Amundsen and Scott carried 'Tabloid' Outfits. So, whichever one of them had won, the 'Tabloid' Equipment would have been first at the South Pole as at the North Pole'[25] (they had also supplied Peary). However, they would not have known that Amundsen was planning to reach the South Pole, as when his expedition set out it was bound for the Arctic.

Other drug companies

BW&Co would supply other drug company's products (presumably when they had no equivalent). Thus Dr Levick asked for, and was supplied with, Trilactine (manufactured by Martindale's).[26] Despite BW&Co wanting exclusive rights to supply medical equipment, this did not always happen. Doctors might take their own drugs. On the *Nimrod* expedition Dr Eric Marshall took a supply of 'Forced March' (Kola compound) which was not part of the formal sledging medical kit. This is described elsewhere.[27] However, this was a BW&Co product (and, later, was part of the official list of drugs for the *Endurance* and *Terra Nova* expeditions).

Roald Amundsen obtained drugs from both Norway and from BW&Co: 'A chemist in Christiania [Oslo] supplied all the necessary medicines as a contribution, carefully chosen, and beautifully arranged'[28] but 'The

National Antarctic Expedition.
1, Savile Row,
Burlington Gardens, W.

The Medical Equipment of the Exploring Ship of the National Antarctic Expedition was entirely supplied by Messrs Burroughs, Wellcome & Co.,and, proved in every way most satisfactory.

The few other drugs and preparations which were taken with the Expedition were only supplied for purposes of experiment, and, can in no way be regarded as part of the medical equipment.

Clements R Markham

27. April 1905

Figure 3. Testimonial form Sir Clements Markham reproduced in Anon. *The Evolution of Antiseptic Surgery.* London: Burroughs Wellcome & Co, 1910: 114.[33]

medical stores for sledging were given by a London firm.'[29] The Australian expedition obtained its drugs from BW&Co but its surgical instruments from Allen and Hanbury.[30]

Despite Dr Koettlitz saying, in a testimonial, 'the medical equipment of the *Discovery* … was entirely supplied by Messrs Burroughs Wellcome & Co …'[9] this was not true as he also obtained drugs from other sources. The *British Medical Journal* said that 'The medicines, mostly in the form of tabloids and palatinoids, are kept in locked cupboards'[31] and in an interview Dr Reginald Koettlitz said that the main medical outfit was supplied by BW&Co but that 'in addition I took a few of Oppenheimer's Palatinoids, which also proved thoroughly successful.'[32] Sir Clements Markham said that the entire medical equipment for the *Discovery* expedition was supplied by Burroughs Wellcome and that 'the few other drugs and preparations taken with the Expedition were only supplied for purposes of experiment, and, in no way can be regarded as part of the medical equipment'[33] (Fig. 3).

Palatinoids consisted of

> two convex disks of soluble jujube containing the purest drugs obtainable of powder or liquid, without the addition of excipient unless the local effect of the medicament would be either corrosive or extremely poisonous. Palatinoids are easily swallowed, accurate in dosage and keep indefinitely. All drugs usually taken as powders, pills or cachets are supplied in this portable and elegant form.[34]

They were used particularly for drugs which were unpalatable to take or which denatured on exposure to the air. In the words of an advertisement:

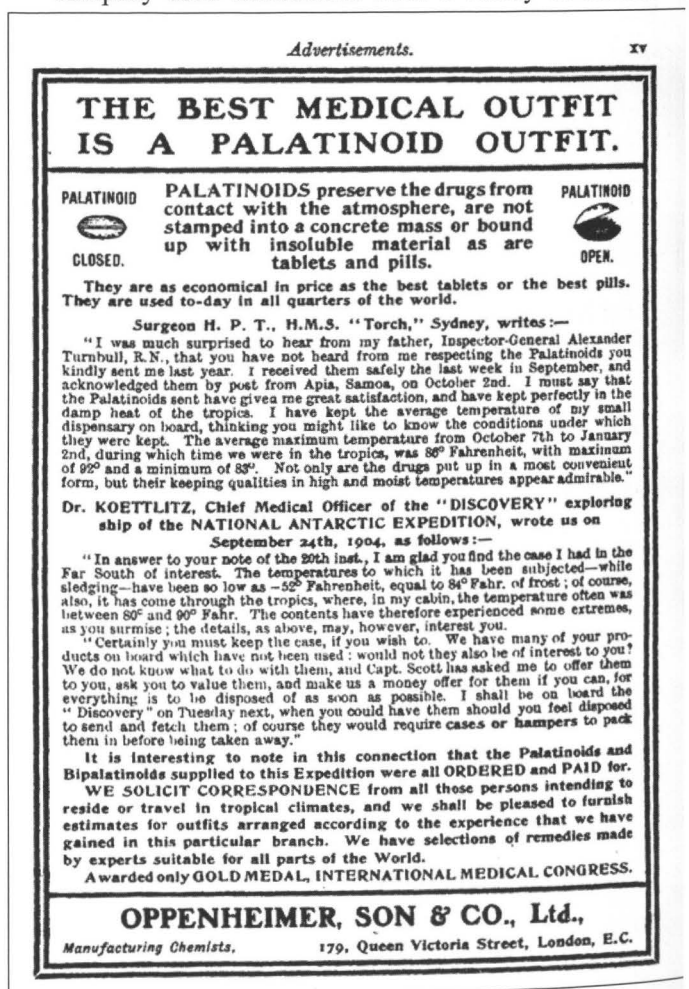
> Palatinoids preserve the drugs from contact with the atmosphere, are not stamped into a concrete mass or bound up with insoluble material as are tablets and pills. They are as economical in price as the best tablets or the best pills.[35]

Although Koettlitz says that he took a 'few' Palatinoids, he is quoted as saying to the company 'we have many of your products on board which have not been used' and offered to sell them back but warned that 'they would require cases or hampers to pack them in before being taken away.'[36] This does not imply small quantities.

Oppenheimer used this letter from Koettlitz to advertise their products[36] to non-medical travellers only a few pages from the BW&Co's own advertisement in the same book[14] (Fig. 4). This cannot have pleased BW&Co and is probably the reason for their insistence on exclusive rights in subsequent British expeditions.

Surveys of the huts used by the explorers have also shown medicinal products not supplied by Burroughs Wellcome. I have described some of these elsewhere.[37]

The ITAE Ross Sea Party also took Hean's Essence or Heenzo, a patent cough medicine. This only seems to have been used in Australia and New Zealand so must have been taken from there. Advertisements for this (Fig. 5) carry a testimonial from Ernest Wild and Ernest Joyce and quote Shackleton (who would not have used it, as the *Endurance* did not visit Australia or New Zealand) as saying 'I am informed that they found the remedy of value under the exceedingly severe conditions experienced in the Ross Sea.'[38] Other advertisements were phrased to imply that he himself used it: 'Heenzo is the remedy for colds, about which Sir Ernest Shackleton and members of his exploration party wrote in terms of high praise.'[39] In its advertising, the company used testimonials from a variety of famous



Advertisements. xv

THE BEST MEDICAL OUTFIT IS A PALATINOID OUTFIT.

PALATINOID CLOSED. **PALATINOIDS preserve the drugs from contact with the atmosphere, are not stamped into a concrete mass or bound up with insoluble material as are tablets and pills.** PALATINOID OPEN.

They are as economical in price as the best tablets or the best pills. They are used to-day in all quarters of the world.

Surgeon H. P. T., H.M.S. "Torch," Sydney, writes:—

"I was much surprised to hear from my father, Inspector-General Alexander Turnbull, R.N., that you have not heard from me respecting the Palatinoids you kindly sent me last year. I received them safely the last week in September, and acknowledged them by post from Apia, Samoa, on October 2nd. I must say that the Palatinoids sent have given me great satisfaction, and have kept perfectly in the damp heat of the tropics. I have kept the average temperature of my small dispensary on board, thinking you might like to know the conditions under which they were kept. The average maximum temperature from October 7th to January 2nd, during which time we were in the tropics, was 86° Fahrenheit, with maximum of 92° and a minimum of 83°. Not only are the drugs put up in a most convenient form, but their keeping qualities in high and moist temperatures appear admirable."

Dr. KOETTLITZ, Chief Medical Officer of the "DISCOVERY" exploring ship of the NATIONAL ANTARCTIC EXPEDITION, wrote us on September 24th, 1904, as follows:—

"In answer to your note of the 20th inst., I am glad you find the case I had in the Far South of interest. The temperatures to which it has been subjected—while sledging—have been so low as −52° Fahrenheit, equal to 84° Fahr. of frost; of course, also, it has come through the tropics, where, in my cabin, the temperature often was between 80° and 90° Fahr. The contents have therefore experienced some extremes, as you surmise; the details, as above, may, however, interest you.

"Certainly you must keep the case, if you wish to. We have many of your products on board which have not been used: would not they also be of interest to you? We do not know what to do with them, and Capt. Scott has asked me to offer them to you, ask you to value them, and make us a money offer for them if you can, for everything is to be disposed of as soon as possible. I shall be on board the "Discovery" on Tuesday next, when you could have them should you feel disposed to send and fetch them; of course they would require **cases or hampers to pack** them in before being taken away."

It is interesting to note in this connection that the Palatinoids and Bipalatinoids supplied to this Expedition were all ORDERED and PAID for.

WE SOLICIT CORRESPONDENCE from all those persons intending to reside or travel in tropical climates, and we shall be pleased to furnish estimates for outfits arranged according to the experience that we have gained in this particular branch. We have selections of remedies made by experts suitable for all parts of the World.

Awarded only GOLD MEDAL, INTERNATIONAL MEDICAL CONGRESS.

OPPENHEIMER, SON & CO., Ltd.,

Manufacturing Chemists, 179, Queen Victoria Street, London, E.C.

Figure 4. Advertisement in Royal Geographical Society. *Hints to Travellers Scientific and General: volume 2*. London: Royal Geographical Society,1906: xv.[36]

Figure 5. Advertisement for Hean's essence (Heenzo). *The Mercury*, Hobart 2 June 1917: 11.

people including Frank Hurley, the photographer on both the Australian expedition and the *Endurance* and who later became a famous war photographer, but there is no Antarctic connection mentioned against his name.[40]

Another Australian patent medicine company hitched its name to Antarctic exploration in a newspaper advertisement with a poorly-scanning limerick:

On the cruise to the Antarctic Sea
Laxo-Tonic pills taken should be
By each on the ship
Then right through the trip
From all ailments they'll surely be free.[41]

This company used many limericks in its advertising and gave prizes for the best limericks submitted by newspaper readers.[42] As far as I can tell, Laxo-tonic (presumably a laxative) was never used in the Antarctic.

Medical foods in the form of 'medical comforts' were also supplied to Antarctic expeditions and this connection was used in advertising, as I have described elsewhere.[43]

Acknowledgments

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Endnotes and References

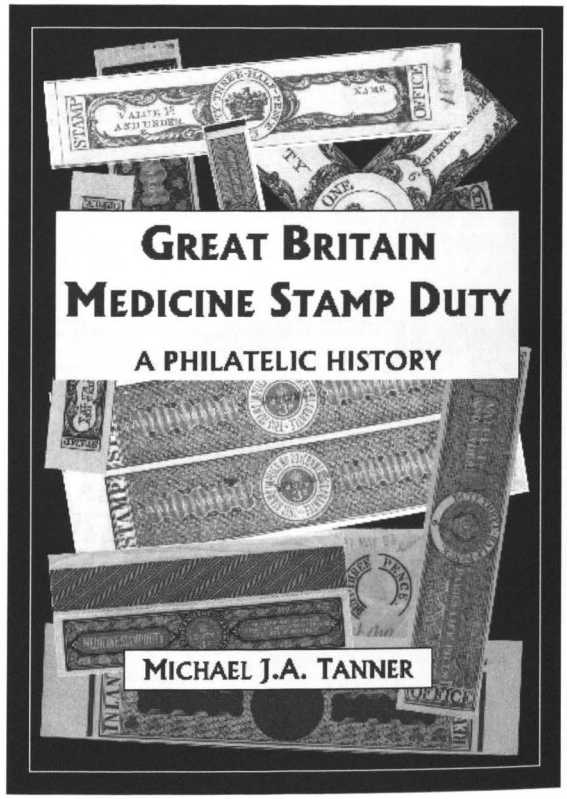
1. Anon. *Crown and Realm. Souvenir of the Coronation of King George V*. London: Burroughs Wellcome & Co, 1911: 375.
2. Beckett C. Attitudes to Political and Commercial Endorsement in the Business Papers of Silas Mainville Burroughs, with Particular Reference to Henry Morton Stanley. *Medical History*. 2008; 52: 107–128.
3. Anon. *The Romance of Exploration and Emergency First Aid from Stanley to Byrd*. New York: Burroughs Wellcome and Co, 1934: 5.
4. Hill J. Globe-trotting medicine chests: tracing geographies of collecting and pharmaceuticals. *Social & Cultural Geography* 2006; 7(3): 365-84.
5. Reference 3: 29
6. Johnson R. Tabloid Brand Medicine Chests: Selling Health and Hygiene for the British Tropical Colonies. *Science as Culture* 2008; 17(3): 249-268.
7. Anon. *The Evolution of Antiseptic Surgery*. London: Burroughs Wellcome & Co, 1910: 110-7.
8. Anon. *Anaesthetics Ancient and Modern: an Historical Sketch of Anaesthesia*. London: Burroughs Wellcome & Co, 1907: 75-82.
9. Anon. *From Ergot to "Ernutin": an Historical Sketch*. London: Burroughs Wellcome & Co, 1908: 71-78.
10. Anon. *Medicine in Ancient Erin: an Historical Sketch from Celtic to Medieval Times*. London: Burroughs Wellcome & Co, 1909, 75-82.
11. Anon. *The Dental art in ancient times*. London: Burroughs Wellcome & Co, 1914: 52-65.
12. Anon. *The Romance of Exploration and Emergency First Aid from Stanley to Byrd*. New York: Burroughs Wellcome and Co, 1934: 53-80.
13. Reference 11:52-65.
14. Advertisement in Royal Geographical Society. *Hints to Travellers Scientific and General: volume 2*. London: Royal Geographical Society,1906: vii.
15. Church R. The British Market for Medicine in the late Nineteenth Century: The Innovative Impact of S M Burroughs & Co. *Medical History*, 2005, 49: 281-298.

16. Anon: Note dated 31.12.1914 (sic) of a meeting "Re Sir Ernest Shackleton's Imperial Trans-Antarctic Expedition 1914". London: Wellcome Library MS WF/M/1/PR/E47.
17. Burroughs Wellcome & Co. Letter to Frank Wild 17 July 1914. London: Wellcome Library MS WF/M/1/PR/E47.
18. Burroughs Wellcome & Co. Letter to George F Wyatt 25 May 1910. London: Wellcome Library MS WF/M/1/PR/E44.
19. Burroughs Wellcome & Co. Letter to Sir Henry Wellcome 6 October 1909. London: Wellcome Library MS WF/M/1/PR/E44.
20. Burroughs Wellcome &Co. Letter to William Spiers Bruce. 8 June 1910. Edinburgh: Edinburgh University Special Collections MS Gen 1651 95/28.
21. Burroughs Wellcome &Co. Letter to Secretary ITAE 16 December 1914. London: Wellcome Library MS WF/M/1/PR/E47.
22. Hutchison & Cuff, Solicitors. Letter to Burroughs Wellcome & Co. 19 April 1915. London: Wellcome Library MS WF/M/1/PR/E47.
23. Hutchison & Cuff, Solicitors. Letter to Burroughs Wellcome & Co. 1 July 1915. London: Wellcome Library MS WF/M/1/PR/E47.
24. Burroughs Wellcome & Co. Letter to Hutchison & Cuff, solicitors, 7 June 1917. London: Wellcome Library MS WF/M/1/PR/E47
25. Reference 12: 67-8.
26. Levick GM. Letter to Burroughs Wellcome & Co. 22 May 1910. London: Wellcome Library MS WF/M/1/PR/E44.
27. Guly HR. Medical equipment taken on expeditions during the heroic age of Antarctic exploration: sledging cases. *Pharmaceutical Historian* 2013; 43(4): 68-72.
28. Amundsen R. *The South Pole Vol. 1.* (Trans. Chater AG). London: John Murray, 1913: 71.
29. Amundsen R. Reference 28: 88.
30. Mawson R. *Home of the Blizzard vol. 2.* London: Heinemann, 1915: 319.
31. Anon. The National Antarctic Expedition ship Discovery. *Br Med J* 1901; 2: 364.
32. Anon. Out in the Antarctic Regions: an interview with Dr R Koettlitz, chief medical officer to the "Discovery" and the National Antarctic Expedition. *Climate and Health* 1905; 5: 188-94.
33. Markham C. Letter to Burroughs Wellcome &Co. 27 April 1905, reproduced in Anon. Reference 7: 114.
34. Anon. Annual Museum. *Br Med J* 1895;2: 428-32.
35. Reference 14: xv.
36. Koettlitz R. Letter to Oppenheimer 24 September 1904 quoted in: Reference 14: xv.
37. Guly HR. Medical supplies for the expeditions of the heroic age of Antarctic exploration: introduction. *Pharmaceutical Historian* 2012; 42 (2):32-36.
38. Advertisement for Hean's essence (Heenzo). *The Mercury* (Hobart) 2 June 1917: 11.
39. Advertisement for Hean's essence (Heenzo) used often but including *The West Australian* 9 November 1918: 5.
40. Advertisement for Hean's essence (Heenzo) used often but including in *The Mercury* (Hobart) 10 July 1941: 2.
41. Advertisement in *The Mercury* (Hobart) 5 January 1909: 7.
42. Advertisement in *Evening Post* (Wellington, New Zealand) 27 February 1909: 13.
43. Guly HR. Medical comforts during the heroic age of Antarctic exploration. *Polar Record* 2013; 49 (249): 110-117.

Book notice

GREAT BRITAIN MEDICINE STAMP DUTY: A PHILATELIC HISTORY

Michael JA Tanner



The aim of this book is to provide a broader philatelic and historical narrative than is provided by the listings of medicine duty labels in revenue stamp catalogues. As well as describing the stamps and their varieties, it describes the proof material available, the fakes and forgeries, background information on the production of the labels, numbers issued (where available), and includes aspects of the social history and administration of the duty. An important feature is the inclusion of a census of the numbers of labels in known major holdings of the stamps.

Fully illustrated in colour. A4, 181 pages.
Published by The Revenue Society, 2013. Price £20. Postage extra. Available from the Revenue Society Treasurer, Tony Hall, 57 Brandles Road, Letchworth, Herts SG6 2JA, UK. Tel: 01462-672323; email: treasurer@revenuesociety.org.uk

Survivors over six millennia: Essential oils

Malcolm E Brown MPhil PhD

MRPharmS MCPP

Beccles, Suffolk

Introduction

Medicaments and pharmaceutical adjuncts seldom remain for millennia. The numbers of index entries between the 17th and the early 21st centuries, in the most authoritative hard-copy British information source (e.g. Martindale) in use during nine separate years: 1633 (Gerard),[1] 1793 (Brookes),[2] 1890 (Squires),[3] 1908 (Squires),[4] 1952 (Capper),[5] 1958 (Capper),[6] 1968 (Todd),[7] 1982 (Reynolds)[8] and 2011 (Sweetman)[9] were counted. The increase was astonishing: approximately 27-fold. Information in Figure 1 illustrates that.[10]

This provides evidence of an explosion of knowledge especially over the last two generations. It follows, if 'importance' is measured by the fraction of the whole body of knowledge available in that particular year, that any one entry in 2011 is only 'worth' about a twenty-seventh of that in 1633. So entries that do survive become more 'valuable'. Moreover, I have witnessed that many entries in the *British National Formulary* on my registration as a pharmacist in 1968 had disappeared, been superseded, in the BNF used on my retirement in 2010. When those perspectives are expanded to millennia, the very few medicaments that do survive matter greatly. They include opium and fragrant materials.

Human bodies can still suffer severe pain; that is a medical emergency. Opium-related medicines remain our strongest analgesics so the survival of opium is easily explained. But why have essential oil-related materials survived? This article will focus upon the liquid fragrant materials called 'essential oils' and tentatively offer one explanation for their survival.

Oils are hydrophobic liquids, unlike fats that are solid at room temperature. Essential oils include concentrated volatile aromatic compounds from plants. They are the intensely scented 'oil of' the plant from which they were extracted, such as clove. Each specific oil smells of their particular plant. Today we know that perceived odour results from one or more empirical chemicals that have an odour. Their molecules are sufficiently volatile to transport in air by diffusion into the olfactory system in the upper nose. Smell builds slowly in a 'crescendo' and then slowly decreases, over a period of seconds to hours, and is not 'instant' such as sight, hearing, touch or proprioception (internal feelings of pain or balance). In general the chemicals must have molecular weights over 300; that is co-related with (comparatively) low boiling points; they vary from about 160° to 270° C. Their odoriferous ingredients typically include alcohols, aldehydes, esters, ketones or terpenes. They have boiling points, generally above that of water but below that of the comparatively odourless fixed oils that contain mainly triglycerides. For example olive oil boils at 300°C; its main ingredient, oleic acid, boils at 360°C. Although at room temperature, the essential oils, by definition, are liquid, their odoriferous ingredient(s) may be solid. Illustrations of volatile oils of historical pharmaceutical importance are shown in Figure 2.

Figure 1 Year and Number Index Entries

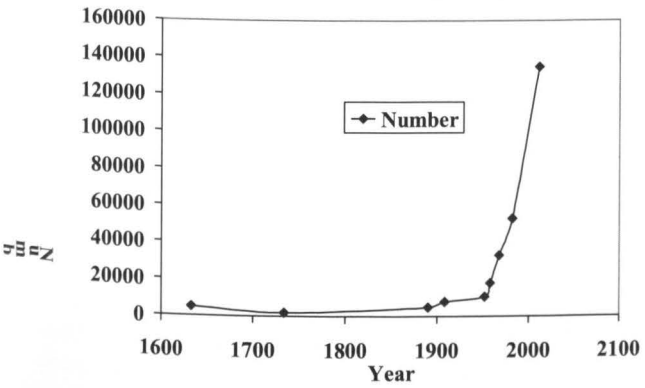


Figure 2: Essential Oils, illustrative odoriferous ingredients and boiling points

Oil	One odoriferous ingredient	
	Name	Boiling point °C
Aniseed	Anethole	234
Bergamot	Linalyl acetate	220
Clove	Eugenol	254
Dill	Carvone	231
Juniper	Camphene	159
Orange or lemon	Limonene	176
Lavender	Camphor	204
Rose	β-Damascenone	274
Peppermint	Menthol	212
Thyme	Thymol	232
Pine	Terpineol	219

Smelly molecules (odourivectors) directly contact odour receptor nerves that are a direct extension of the comparatively nearby brain. One suggestion is that the specific nerve fires if the odourivector's molecule fits into the olfactory nerve as a key in a lock. There are about thirty types of anosmia (partial odour 'blindness') and that may suggests that about thirty types of odour receptor may exist. One type, for example could be a hemispherical socket for a spherical camphor-smelling molecule.[11] But there may be a smaller number of basic primary odours correlating to odour receptors for each, much as the spectrum of perceived colours in visible light is generated by the activation of three primary

colour receptors. In 1949, Amoore suggested a stereochemical theory requiring seven primary odours, for example, include floral, minty, musky, camphoraceous, ethereal, pungent and putrid.[12] Olfactory nerves function in parallel with nerves of taste in the mouth with their specific 'lock' receptors for particular tasty 'keys'. To perceive smells (and tastes) the brain mingles input from smell and taste. Interestingly, the odoriferous molecules of menthol also act on receptors for cold; they lower the threshold for firing. This explains why menthol-containing dentifrices feel fresh and tingle.[13] When the olfactory bulb detects an odour, it signals the cerebral cortex and sends a message directly into the limbic system, where we feel, lust and invent. That part of the brain is so ancient that we share it with lizards. Unlike other senses, smell needs no interpreter. Once perceived the effect is immediate and requires no thought or translation and cannot be censored. Sound and vision that we experience in short-tem memory seem to quickly fade and become inaccessible but smells induce intense nostalgia.

Perfume is liquid memory.[14] Whenever I smell a rose on an evening after rain, I am *instantly* transported: my 5-year old self is in my grandmother's garden with roses around the door and an air-raid shelter and chickens clucking. Whenever I smell gaseous anaesthetic, it transports me into being a post-graduate student undergoing practical training in hospitals: *suddenly*, I am scrubbing out a large stained porcelain sink with an ether soap, bleach and scouring powder suspension. Kipling observed in his poem *Lichtenberg*, 'Smells are surer than sights and sounds to make the heart-strings crack.' When we add that to smell seeming to wash over us, to arrive and leave slowly, no wonder the ancients noticed aromatic medicaments, mentioned them in their literature and left traces in their artefacts for us to detect.

Ancient history

The Mesopotamians lived between the Tigris and Euphrates rivers corresponding to modern Iraq, Northeastern Syria, Southeastern Turkey and smaller parts of southwestern Iran. I can imagine an inquisitive Mesopotamian slicing open a sun-warmed ripe orange skin with a finger-nail and a spray squirting out, illuminated in a sunbeam and, on impulse, sniffing it in. An intense pleasing odour from ruptured schizogenous glands resulted. That simple pressure technique would yield very little essential oil, but it would be a finite volume. I further speculate that our adventurer might have wanted to collect this liquid pleasure and store to enjoy after the orange had lost its scent.[15] What is fact is that when we use tools on materials using our bodies, particularly our hands, and reflect on what we can do (such as fabricating equipment in order to make essential oils) intuitive mental leaps happen.[16] This article outlines the journey of pharmaceutical artisans and others interested in essential oils, from antiquity to today.

What is known is that the Mesopotamians could extract natural plant aromas. Witness from Campbell Thompson's *Assyrian Prescriptions for Bruises and Swellings*:

> cedar, cypress, fir-turpentine, pine-turpentine … lemon … all plant-drugs, all aromatics … thou shall put, boil in a small copper pan.[17]

We presume their pharmaceutical formulae developed by trial and error. Those dense herbal materials on, presumably, simmering, became a pharmaceutical concoction. As an aqueous solution was being boiled, the temperature would have slightly exceeded 100^{0}C at sea level. Because of the *copper* pan, this occurred in the copper age: about 4000 BC – six millennia ago.

There in some evidence that the Mesopotamians possessed distillation pots. Perhaps distillation, even if unwitting, was achieved. Distillation pots have been found in Tepe Gawra, Iraq, dating back to about 3500 BC.

One double-rimmed earthenware pot is of about 37L capacity; the double rim allowed about 2L of distillate condensed against the lid to be collected. It was the most primitive form of the later *aludel*. Texts mention its careful heating and instruct how to keep the heat from reaching the rim, the primitive receiver of the distillate. However, it is presumed that they did not understand the principle of distillation.[18]

The Egyptians were their geographical neighbours from round 3000 BC. The embalmers who attempted to preserve cadavers, including against bacterial decay, used materials such as initially soda (natron) to dehydrate, then pitch, *juniper oil* (my italics), frankincense and myrrh. Many materials were used; the result had a 'strongly aromatic aroma'.[19] This is important: the first reference to an essential oil (juniper) as a specific refined material that this present author can find. However, at least one other author has a different opinion about Egyptian essential oils.[20] Presumably perfumes counteracted to some extent the stench of decay. Egyptians used perfumes for three purposes: embalming, aesthetic during their lives to enhance an individual's status and as offerings to deities.[21] The aromatics diffused upwards to please and/or placate the gods. It is probable that priests made most of the perfumes; the pursuit was considered mysterious: an esteemed art.

Most essential oils are thought to have been produced by a type of enfleurage extraction: the 'most antique method of extraction known'. The vegetable material is pressed in plant or animal fat (grease) that absorbs the aromatic material.[22] If the technology of the still, to distil spirits, mainly alcohol, had diffused from the Mesopotamians, perhaps that aromatic grease was then washed in alcohol: perfumed alcohol would result. Egyptians also used maceration: comminution and immersion in hot oils and expression presumably by presses.[23]

The Ancient Greeks took over and absorbed the wisdom of the Egyptians. The Roman historian Pliny tells us that the Greeks (and Romans) flavoured both their sauces and their wines 'with (peppermint) essence'. Presumably this refers to some kind of aqueous decoction or infusion. The ancient Greek physicians

used two species of mint, but some writers doubt whether either was the modern peppermint, though there is evidence that the Egyptians cultivated *M. piperita*.[24] Modern peppermint is a hybrid of watermint[25] and spearmint.[26] Hippocrates (460-377 BC) included aromatherapy massage in his treatment. Rose, violet and lily were popular as perfumes; this present author does not know whether these were extracted as essential oils.

The first evidence of distillation is in Alexandria around the first century AD.[27] An unmistakable drawing of a complete 'modern-looking' still, perhaps from around the third century AD, is shown in Figure 3.

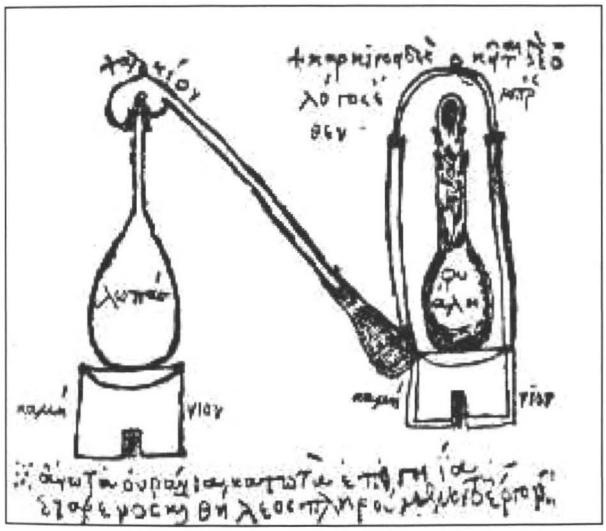


Figure 3. Early still of Zosimus, Alexandria.[27]

In turn, the Romans took over the medicinal wisdom of the Greeks; this was part of a wider appropriation of knowledge such as much of Greek lore about stars. Some Bible experts say mint was among the 'bitter herbs' mentioned in Exodus 12:8 and Numbers 9:11. Mint was eaten after meals as a digestive aid. Again this author is unable to discern any evidence of an actual volatile oil being used. Galen was a Roman physician important enough to be selected as the right-hand bearer of the arms of the Pharmaceutical Society of Great Britain in 1844.

After the fall of the Roman Empire, the Arabic empire rose. It embraced not only Greek and Roman teachings but also those of China and India. The Persian physician Avicenna, or Ibn Sina, in Persian (980–1037 AD), the left-hand bearer of the Society's arms,[28] was amongst those who made perhaps the most significant advance in distillation for essential oils.[29] Few people appreciate that Avicenna proposed the first law of motion 600 years before Newton.[30] At around Avicenna's time steam distillation was invented: a seminal event for the extraction of essential oils.

On heating, the two mutually immiscible liquids (volatile oil and water) exert their respective vapour pressures, independently, in their mixture; that changes with temperature. Total vapour pressure increases (Raoult's Law). The mixture starts boiling when the total vapour pressure exceeds atmospheric pressure. Many aqueously-insoluble organic compounds, such as the complex mixtures comprising essential oils, can be so purified at a temperature below that of their thermal decomposition. Using steam distillation, almost 100% of essential oil of high quality and purity can be extracted from botanical material.[31]

Meanwhile, during the European Dark Ages (about the 5th to 15th centuries) monks in monasteries were influential in keeping pharmaceutical knowledge alive. It might be presumed, on the one hand, that the Crusaders were influenced by Arabic techniques and brought back to Europe sophisticated steam distillation of volatile oils. On the other hand, those ideas might have been be discounted as being from Saracens and therefore heathen and polluting.[32,33] Sometime before 1250, Gilbertus Anglicus produced the *Compendium of Medicine*. This author can find no reference to essential oils in a partial translation although that did acknowledge the benefit of aromatic materials for nausea:

> a little aromatic wine will also benefit the patient, and a few aromatic seeds chewed in the morning are also of service.[34]

Recipes containing oils are mentioned. Further research is required to see if they include essential oil(s), perhaps in the more detailed copy archived at the Royal College of Surgeons, London.[35] That might comprise the first documentary evidence of essential oils in Britain. During the Black Death in 1348-9, some opinion describes contemporary plague doctors as wearing bird-like masks. However, more opinion appears to attribute the invention of the 'beak doctor' costume to the French physician Charles de Lorne (1619). Plague doctors wore masks with long beaks containing powerful-smelling medicaments, ie an early biohazard suit (Fig.4). One essential oil was bergamot oil.

Renaissance onwards

During the European Renaissance (14th to 17th century) one person could no longer know everything. To

Figure 4. Plague Doctor showing Beak containing essential oil. Engraving by Paul Fürst, (1656).

discover the secrets of nature, man had to *torture* it,[36] such as by the violence, the dismemberment, of distillation. Paracelsus (1493–1541) distilled alcohol from wine and considered alchemical process including fire a universal way of concentrating the specific properties of a substance, although his chemical theories are challenging for modern eyes to attempt to understand.[37] Distillation became well-established. The rich houses of England boasted 'still-rooms' where servants distilled spirits; servants sweated to prepare refined requisites for refined people. In still-rooms servants also manipulated 'citrus peel'.[38] Charles 1st was anointed at his coronation in 1626 with a mixture including musk, civet, ambergris, flowers of benzoin, *and oils of orange flowers, roses, cinnamon, jasmine and sesame* (my italics).[39] By the 17th century, nearly all classes used cosmetics. An Act of the English parliament intended to protect men beguiled ('seduce and betray') into matrimony

> by the *scents* (my italics), paints, cosmetic washes, artificial teeth … incur the penalty (of) law in force against witchcraft … and marriage … null and void.[40]

Since the 17th century, the scientific method has characterised natural science, consisting in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses, iteratively. Or put colloquially, observe, guess, test and propose, again and again.[41] Presumably, this will have been applied to the production of essential oils by the late renaissance.

From the 19th century, laboratory-based science became more dominant. Early teaching at the newly established Pharmaceutical Society of Great Britain and its examinations were influenced, for example, by prestigious German chemical laboratory science.[42] Indeed, in the fourth quarter of the new Society's coat of arms was an alembic and receiver, an early apparatus for distillation that represented the pharmacists' chemical skill. It also symbolised the new drugs, some of which were single, pure chemical entities. The tempestuous development of organic chemistry helped improve the design of stills. Stills, retorts, vacuum evaporators (able to function at lower temperatures) and steam boilers became commonplace.[43] Steam distillation is a method for distilling thermolabile compounds. The temperature of the steam is easier to control than the surface of a heating element, and allows a high rate of heat transfer without heating at a very high temperature. This process involves bubbling steam through a heated mixture of the raw material (e.g. leaves or flowers). Some of the target compound will vaporise (in accordance with its partial pressure). The vapour mixture is cooled and condensed. That usually yields a layer of oil and a layer of water. A Florentine receiver may be used to separate this mixture, depending on whether the essential oil is less or more dense than the watery herbal distillate. The position of the tap to drain off the oil is high or low respectively.[44]

One notorious appearance of peppermint oil in the 19th century was in 1858 when 200 people suffered arsenic trioxide poisoning and 20 died in Bradford after eating peppermint humbugs. The arsenic was substituted for a cheap sugar replacement ('daff': often calcium sulphate) by the druggist Charles Hodgson. However, peppermint oil had been used in their manufacture. The essential oil itself was safe and damaged only by association.

Recent history

By the early 20th century in the USA (and presumably the UK), ordinary people, non-specialists, undertook DIY preparations including dry and steam distillation.[45]

In the 1960s, plants from which essential oils were derived still mattered. They formed a significant part of the Pharmacognosy curriculum for future pharmacists. For example, I was examined, while being timed walking along a bench offering a row of ten natural products. Examples were: anise, cardamom, cassia, chamomile, cinnamon, dill, fennel, ginger, nutmeg, and Penang and Zanzibar cloves. Identification was required. One mark was awarded for each correct answer but any incorrect answer lost a mark, so deterring guesses. During one year I had glued a sample of each drug on cards by my bedside in the hope of memorising their appearance; a boxful, well beyond their expiry date, still lurks in the attic.

In the 'peppermint water' case (1998), a baby died in the UK after a concentrate was incorrectly diluted. Examinations for the assessment of pharmacy pre-registration students include a section on calculations (no electronic calculators allowed) that students must pass before registration.

Today, essential oils remain important: a significant article of commerce, globally. One estimate, extrapolated from 1989 data, suggests, for example, 12,000 tonnes of sweet orange, 4,800 of peppermint, 2,600 of cedar wood, 2,100 of eucalyptus, 2,300 of lemon and 2,000 of clove.[46] *Martindale*[9] gives information on about 60-70 varieties of essential oil.[47] Uses includes pine-smelling disinfectants, gripe water, mouthwashes, toothpastes, medicine flavourings, toothache applications, aromatherapy oils and topical preparations such as kaolin poultice that contains 0.05%, thymol and 0.05% peppermint oil. Peppermint oil 0.2 mL remains regularly prescribed for the relief of abdominal colic and distension, particularly in irritable bowel syndrome.[48] Lavender oil may assist relaxation in recovering cancer patients, for example.

The ancient process of enfleurage is seldom used. It now includes extraction by solid odourless fat, washing the fat with alcohol and evaporating off that alcohol; the essential oil such as jasmine remains. Most flowers contain too little volatile oil to undergo the pressing used for olive oil. Some odoriferous chemicals are too thermolabile even for steam distillation. A more modern technique used is dissolving in a solvent such as the comparatively inert supercritical carbon dioxide. Carbon dioxide is a gas in air at standard temperature and pressure or a solid (dry ice) when frozen. If the temperature and pressure are both increased from standard temperature and pressure to be at or above

the critical point for carbon dioxide (31°C and 72.9 atmospheres or 7.39 MPa) it adopts properties between a gas and a liquid: a supercritical fluid. Hexane is also used.[49] Stainless steel, an innovation from World War 1, heavy-duty equipment is required. How our Mesopotamian antecedent would have marveled!

Another insight is that essential oils, from an evolutionary viewpoint, are a plant's chemical defences against being eaten by herbivores. But we humans have had our way with plants. We have ransacked that treasure trove of natural products. We have ordered them, categorised them in our minds and manipulated them with our ever-improving technology. The rage for order is a basic human trait, not least amongst scientists. The nuclear physicist Schrödinger said that science is 'necessary but not sufficient'.[50] Similarly for pharmacy, science is necessary but is not sufficient; pharmacy also requires practice, an understanding of history and what it is like to subjectively, experientially, live within a human body. Volatile oils help us do just that.

Patients, who have bodies, go to healers and anyone professing expertise, to obtain more assured, ordered futures: an extraordinary anticipation. In the non-human universe, disorder (entropy) tends to increase over time. Dropped cups smash into bits: they do not spontaneously rejoin; galaxies spread apart as their order fades. However, a competent professional reduces disorder in patients' lives so (temporally) appearing to 'reverse' the otherwise ubiquitous direction of the arrow of entropy. Pharmacists achieve this with medicines and proud publicity. Today, in encounters with ordinary people, community pharmacists display prominently and sell profitable aesthetic image enhancers such as perfumes and dentifrices – containing essential oil(s). They serve clients' hopes and dreams of reverting to youthful norms such as glamour.[51] Ancient Egyptian embalmers served the extreme hopes of their aristocratic clients, aided by juniper oil. The direction of the arrow in this sociological interpretation collides with its direction in a dominant natural scientific paradigm. This present metaphorical explanation conflates the languages of social and natural science, arguably doing some violence to each. However, those desirable odoriferous portable materials do offer, phenomenologically, an entropy-reversing effect that users crave. I suggest this is more than a mere play on words. Perhaps it explains why essential oils have survived for six millennia.[52]

Archeologists ask, "What artefact(s) (of our present civilisation) will I (a future archeologist) dig up in a hundred years time?"[53] Essential oils will be present and sufficient should have survived for analysis amongst the detritus deposited in 2013.[54] Suppose that question is projected forward: "What, of the civilisation of just a century before, will an archeologist six millennia in the future dig up?"

What will be among that 81st century detritus? Will it include toothpaste, or an equivalent formulation, containing odoriferous molecules found in essential oil?

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Endnotes and References

1. Gerard J. *The Herbal or thr general History of Plants.* London: Adam, Isip, Joyce, Norton, Richard, Whitacre, 1633. Facsimile New York: Dover , 1975
2. Brookes R. *General Dispensatory.* London: Rowley, Newbery and Owe, 1793.
3. Squire PW. *Companion to the British Pharmacopoeia.* Edinburgh: Churchill, 1890.
4. Reference 3, 1908.
5. Capper KR (ed.) *The Extra Pharmacopoeia (Martindale).* 23rd Edn, vol. 1. London: Pharmaceutical Society of Great Britain, 1952.
6. Capper KR (ed). *The Extra Pharmacopoeia (Martindale).* 24th Edn, vol. 1. London: Pharmaceutical Press, 1958.
7. Todd RG (ed.) *Extra Pharmacopoeia Martindale.* 25th Edn. London: Pharmaceutical Press,1967.
8. Reynolds JEF (ed.) *Martindale: The Extra Pharmacopoeia.* 28th Edn,1982.
9. Sweetman SC (ed.) *Martindale: The Complete Drug Reference.* 37th Edn, vols A & B, 2011.
10. This analysis has a Western bias. This calculation ignores the whole of the world-wide-web as an information source; that was not developed even in 1982. Arguably, the web is now the most authoritative information source (*Martindale*'s index contents form just one public part). This author suggests that, if the web were accessed using 'data mining' that tweaks database software and specialist search engine algorithms, the number of 'index entries' resulting would be astronomically large. Then, Figure 1 for 1982–2013 would approximate to a vertical straight line.
11. Atkins PW. *Molecules.* New York: WH Freeman, 2000: 124-5.
12. Ackerman DA. *A Natural History of the Senses* London: Chapmans, 1990: 14.
13. Advertisers have capitalised upon this property. The first commercial shown on TV in Britain was for toothpaste in 1955. Viewers saw a toothpaste tube embedded in a block of ice and a woman brushing her teeth. They heard, "It's tingling fresh. It's fresh as ice".
14. Ackerman D. Reference 12: 11.
15. Expression remains in use today for some citrus fruit oils.
16. Sennett R. *The Craftsman.* London: Penguin, 2009: 290.
17. Majno G. *The Healing Hand: Man and Wound in the Ancient World.* Cambridge: Harvard University Press, 1975: 63-4.
18. Forber RJ. The Evolution of the Still. *Proceedings of the Chemical Society* 1962 July: 237.

19. Majno G. *The Healing Hand Man and Wound in the Ancient World*. Cambridge MA: Harvard University Press, 1975: 137. Majno is a pathologist.
20. Lis-Balchin M. *Aromatherapy science: a guide for healthcare professionals*. London: Pharmaceutical Press, 2006: 7. Lis-Balchin is a biochemist/zoologist and physiologist. She emphasises that 'There are no concrete references to essential oils in any herbal, nor in hieroglyphs of Ancient Egypt or other ancient scripts'.
21. Poucher WA. *Perfumes, Cosmetics and Soaps, Vol II The Production, Manufacture and Application of Perfumes*. London: Chapman & Hall, 1993: 3.
22. Enfleurage - per Accademia del Profumo, http://accademiadelprofumo.it Accessed 19 Mar 2013.
23. Lis-Balchin M. Reference 20: 10.
24. www.nda.agric.za/docs/Brochures/ProGuiPeppermint.pdf Accessed 19 Mar 2013. *Peppermint Production*. Department of Agriculture, Forestry and Fisheries, South Africa, 2012.
25. One stimulus for writing this article, especially the observation that, arguably, medicaments that had survived since antiquity were particularly important, was an ecological observation. I noticed that a pond that had had been fragrant had lost that aroma. Once profuse native *watermint* was being smothered by invasive alien New Zealand Pigmyweed *(Crassula helmsii)*.
26. http://en.wikipedia.org/wiki/Peppermint Accessed 22 Mar 2013.
27. http://en.wikipedia.org/wiki/Distillation Accessed 23 Mar 2013.
28. *The Society's Coat of Arms*. Museum, Royal Pharmaceutical Society of Great Britain information sheet.
29. Forbes, RJ. *A Short History of the Art of Distillation: from the beginnings up to the death of Cellier Blumenthal*. Leyden: EJ Brill, 1970: 29-54.
For online preview version (accessed 22 Mar 2013) see http://books.google.co.uk/books?id=XeqWOkKYn28C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
30. Strathern R. *Mendeleyev's Dream: The quest for the elements*. London; Penguin, 2000: 48.
31. Cooper JE, Gunn C. *Tutorial Pharmacy*. London: Pitman Medical, 1962: 109-17.
32. http://www.william-shakespeare.info/bubonic-black-plague-elizabethan-era.htm Accessed 20 Mar 2013.
33. Douglas M. *Purity and Danger, An Analysis of the Concepts of Pollution and Taboo*. London: Ark Paperbacks, 1984 (original 1966).
34. Handerson HE. *Gilbertus Anglicus*, M*edicine of the thirteenth century*. Private publication. Online version: http://www.archive.org/stream/gilbertusanglicu00hand/gilbertusanglicu00hand_djvu.txt Accessed 22 Mar 2013.
35. Mole P. Archivist, Royal College of Surgeons of England (RCS), personal communication 22 Mar 2013. Archive reference MS0175. The entries for the *Liber Trotularis*, from which Gilbertus Anglicus took some of his material, are in the archive catalogue of the RCS, London: http://surgicat.rcseng.ac.uk Accessed 22 Mar 2013.
36. Strathern R. Reference 30: 67.
37. Pagel W. The Prime Matter of Paracelsus *Ambix* 1961; Oct; IX (3): 117-35.
38. Wilson B. *Consider the Fork: A History of Invention in the Kitchen*. London: Particular Books, 2012: 288.
39. Anon. Secret formula of Anointing Oil. *The Townsville Daily Bulletin incorporating the Townsville Evening Star*: 1953, 30 May: 1. (An Australian newspaper)
It is understood that oil used during the coronation of British monarchs has long been made to this formula. Moreover, certain sacred containers are fabled to contain traces of the first oils used.
40. Poucher WA. Reference 21: 12-3.
41. Waigh RD. What do we mean by 'science'? *Pharm J* 1997; 257: 361-4.
42. Holloway SWF. *Royal Pharmaceutical Society of Great Britain 1841-1991: A political and social History*. 1991: 115-7.
43. Matthews LG. *History of Pharmacy in Britain*, London: Livingstone, 1962: 320.
44. Cooper JE, Gunn C. *Tutorial Pharmacy*. London: Pitman Medical, 1962: 115.
45. Hiscox GD. *Henley's Formulas for Home and Workshop*. New York: Crown Publishers, 1979. (Facsimile of *Henley's Twentieth Century Formulas, Recipes and Processes*, 1907.)
46. http://en.wikipedia.org/wiki/Essential_oil Accessed 22 Mar 2013.
47. Krumbach M. Librarian, Royal Pharmaceutical Society of Great Britain, personal communication 25 Mar 2013.
48. Joint Formulary Committee, *British National Formulary* 2013; No. 65.
49. Supercritical Carbon Dioxide, accessed 22 Mar 2013. http://en.wikipedia.org/wiki/Supercritical_carbon_dioxide
50. Strathern R. Reference 30: 278.
51. Revson (1906-1975), expert cosmetics manager of *Revlon* (who also manufacture perfumes e.g. *Charlie*), said, "In our factory we make lipstick. In our advertising, we sell hope."
52. Brown ME. Pharmacists: emperors of entropy. *Pharm J* 2000; 264: 769.
53. Weber RJ. *Forks, Phonographs and Hot Air Balloons: A Field Guide to Inventive Thinking* Oxford: Oxford University Press, 1992: 217.
54. Present day molecular archaeologists can identify miniscule traces in vessels such as a grape/hawthorn tree fruit from 9,000 years ago (Romero AA, Chant C, Gibbons R *et al. How do they do that?* Milton Keynes: Open University, 2012: 3).

Wandsworth's Vanishing Hospitals

Norma Cox
Wandsworth, London

Jim Slade wrote in the *Wandsworth Historian* (Spring 2012) about the loss of the smaller shops from the streets of Putney since the 1950's.[1] These shops have been replaced by supermarkets and bars. The article made me think about changes that have occurred to the hospitals in Merton, Sutton and Wandsworth Area Health Authority, where I used to work as a pharmacist. These were: Bolingbroke Hospital; South London Hospital for Women and Children; St James' Hospital; and St George's Hospital, Hyde Park Corner. All these hospitals were purpose built. The closure of the hospitals was the cause of considerable concern to local people. It was argued that it was more efficient to have all of the medical expertise on one site, so they were consolidated at St George's Hospital, Tooting. The need for hospitals had not ceased, in fact with the growing population it had increased.

Bolingbroke Hospital

The hospital, situated on the corner of Wakehurst Road and Bolingbroke Grove (Fig. 1), was a small acute hospital.[2] In 1977 it had a specialist coronary care unit (under the directions of the larger coronary care unit at St George's Hospital). In 2008 Bolingbroke Hospital became a geriatric hospital and in 2011 it was closed. Wandsworth Council bought the derelict hospital to ensure it remained in community use.[3] Due to its splendid architectural features, it was granted Grade II listing by English Heritage in 2012.[4] In September 2012 Bolingbroke Hospital became a new academy school.

It is a handsome redbrick building, built by Young and Hall in 1901-1936. It replaced the original hospital on the site, which was a mansion house converted to a hospital in 1880 by Rev John Erskine Clarke, the vicar of St Mary's Battersea, to meet the demand for a hospital in the area.[5] The building has many Art Deco features, including tiles made by Simpsons of St Martins Lane and tile pictures by Carters of Poole.[6] The tile pictures in the children's' ward show characters from novels by famous authors (Fig. 3). There are also 13 panels depicting: Humpty Dumpty; Jack and Jill; and Tropical Birds. In the entrance lobby to the hospital there is a reception booth and a war memorial. From the octagonal hall radiate three corridors. The walls are pale green marble veneer. And the surrounds of the doors, are dark verde marble. The doors have gilt lettering announcing the occupant of each room, eg Matron. There was an Annie Zunz Ward named after the wife of a German metal merchant. She died childless and her heartbroken husband left legacies to several London hospitals including Bolingbroke to name a ward after his late wife and display a plaque to her memory.[7]The dispensary was in the basement beside the X-ray department.

Figure 1. Bolingbroke Hospital, Wandsworth SW11 6HN.

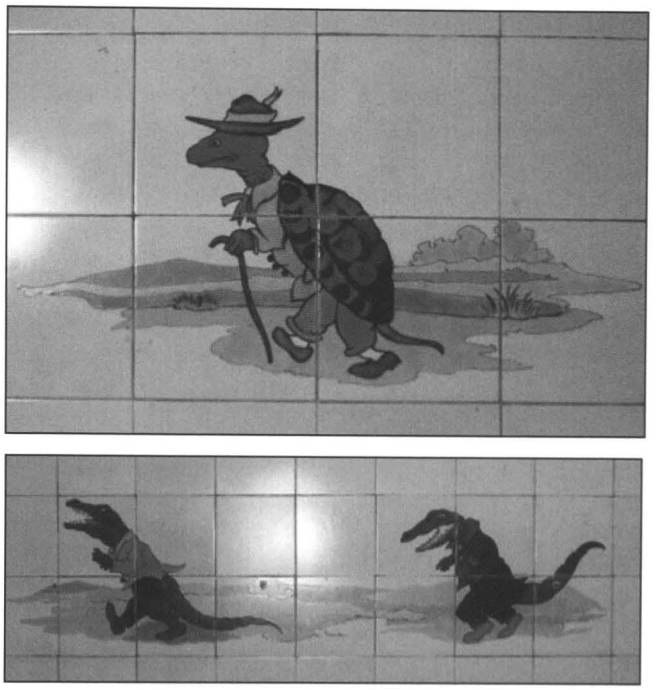


Figure 2. Two tile panels from Bolingbroke Hospital.

South London Hospital for Women and Children

This was an acute hospital at Clapham South. It was the vision of two women surgeons, Eleanor Davies-Colley and Maud Chadburn, who worked at the New Hospital for Women (later called Elizabeth Garret Anderson Hospital). There was such a demand at the New Hospital that patients were being turned away. A letter to *The Times* declared the project was unnecessary and was a means for women to force themselves into medicine. This comment caused widespread anger, including from the suffragette movement. Anonymous donors gave £53,000 and a £40,000 endowment. With these generous

Figure 3. South London Hospital for Women SW4.

donations building was swift. The hospital was designed in 1913 by the architect Sir Edwin Cooper. It was described as an impressive landmark building and a good example of Neo-classical 1920s architecture (Fig. 3). It had an all female medical staff. The hospital was opened by Queen Mary on 4th July 1916.[8]

In 1983 Wandsworth Health Authority deemed the hospital uneconomic and the hospital closed to in-patients in the summer of 1984 and to out-patients on 15th March 1985.There was a great upset. Staff occupied the hospital to force the authorities to change their minds.[9,10] A baby was born at the hospital even though the in-patients had closed. Forty women who had barricaded themselves in were forcibly evicted when the doors were broken down. A warrant for re-possession of the building was served on 17th March 1985. The building was secured, medical records and equipment removed and the building barricaded up to ensure it would not be re-occupied.[11]

Unfortunately the building was not listed by English Heritage. There was beautiful wooden panelling and an Elizabethan-style staircase. In the out-patients hall there was chequered flooring and a beam roof. The dispensary was attached to the out-patients hall. There was a cloistered rose-garden in the centre of the site which you passed on the way to the staff canteen. The façade of the hospital was improved by the removal of the awkward ambulance ramp and porch and replaced by an elegant flight of stairs with a classical balustrade designed by Giles Quarne. Only the façade was preserved while the rest of the site became a Tesco store and flats.

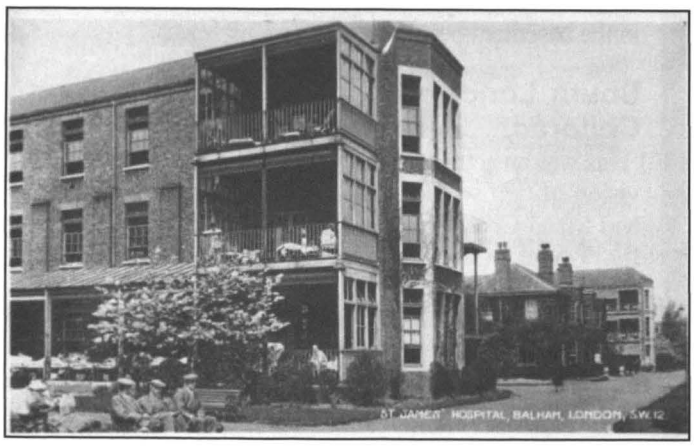


Figure 4. St James' Hospital, Balham SW12 8HW.

St James' Hospital, Balham

St James' Hospital, Balham was also an acute hospital. It was built in 1909-1910 by the Wandsworth Board of Guardians in Ouseley Road, on the site of the St James Road Industrial School, a school for young offenders linked with the St James' Branch of Garratt Lane Workhouse.[12] During World War I, the Infirmary (as it was then known) became an auxiliary military hospital for the First London General Hospital. In 1920 the hospital's name was changed to St James' Hospital. In 1923 and 1926 new nurses accommodation was added and in 1930 the hospital was further expanded by the LCC. During WW2 flying bombs damaged three wards, the boiler house and the laundry. It is said that over 200 flying bombs fell in this area. In 1948, with the formation of the NHS, it was transferred to the Wandsworth Hospitals Management committee.

A new Out-Patient complex, nurses' accommodation and a new Accident and Emergency was added in 1951. A Pathé News film clip of 1954 shows the out-patient department in use.[13] The hospital's architecture can be seen as modern and light. I remember the dispensary was on ground level. The TV series 'Angels' was filmed in the grounds of St James' Hospital at the time. The hospital was amalgamated with St George's Hospital in 1980 and the St James' Hospital was demolished in 1988. The land was sold for new housing.

St George's Hospital, Hyde Park Corner

St George's Hospital became part of the Wandsworth Health Authority in 1977. The original teaching hospital was built in 1719 at Lanesborough House and was later rebuilt between 1827-1844. The dispensary was in the basement and there were underground passages leading to it. The wards on the first floor had large windows affording an excellent view over Hyde Park.

Plans were first drawn up in 1948 to move to the sites of the Grove Fever and Fountain Hospitals in Tooting. In 1973 the building of the new hospital began and in 1976 St George's Hospital Medical School moved to Tooting. St George's Hospital started transferring to the site in 1977.[14] In 1980 St George's Hyde Park Corner closed its doors for the last time and became a Hotel in 1991. Following its sale in 2001, it was re-named the Lanesborough Hotel.[15] It is a Grade II listed building.[16]

Although it is emotional to close hospitals, medicine has advanced significantly since the advent of the NHS. It is now more efficient to have all the diagnostics to hand, on one site with consultant teams and an attached medical school. Many conditions can be treated in primary care without the need for hospitalisation, which is costly and also adds the risk of infections by 'super-bugs'.

Author's address: norma.cox6333@gmail.com

Endnotes and References

1. *Wandsworth Historian* No. 93; Miscellany: 17-18.
2. Lost Hospitals of London. ezitis.myzen.co.uk/bolingbroke.html
3. Parents celebrate new look Bolingbroke [academy]. www.wandsworth.gov.uk/news/article/11021/
4. Bolingbroke Hospital, Wandsworth. www.britishlistedbuildings.co.uk/en-505881-bolingbroke-hospital-greater-london-auth
5. John Erskine Clarke. en.wikipedia.org/wiki/John_Erskine_Clarke
6. Carter's Tiles. www.pooleimages.co.uk/Pages/CartersTiles.aspx
7. www.hharp.org/library/gosh/general/ward-names-html
8. en.wikipedia.org/wiki/South_London_Hospital_For_Women_and_Children
9. *Wandsworth Borough News* 1984 (6 July): 1.
10. *Wandsworth Borough News* 1984 (14 September): 1.
11. *Wandsworth Borough News* 1985 (29 March): 2.
12. St James' Hospital. www.ezitis.myzen.co.uk/stjames.html
13. Hospital 1954. www.britishpathe.com/workspaces/across-the-boards/eaR28ugD
14. St George's Hospital. en.wikipedia.org/wiki/St_George's_Hospital
15. en.wikipedia.org/wiki/The_Lanesborough
16. www.refurbishment-in-london.com

Book Review

The School of Pharmacy, University of London: Medicines, Science and Society, 1842-2012

Briony Hudson in collaboration with **Maureen Boylan**. London: Academic Press, 2013, pp.xi+214 (hardback, price: £30.99) ISBN 978-0-12-407665-5.

Institutional histories commissioned to commemorate particular occasions, such as the anniversary of their foundation, all too often turn out to be worthy but uninspiring, celebratory but sycophantic, and honourable but pretentious. Indeed, some do little more than list the successive achievements of the great and good associated with the institution. It is extremely pleasing, therefore, to report that this work successfully manages to avoid all these tendencies, which is a testament not only to the author but also to those who commissioned it.

This book is much more than an institutional history; it is an important and scholarly piece of work. It makes an important contribution to our understanding of the history of pharmacy education in Great Britain, with the first two chapters especially providing a detailed account of its evolution and its social and political context. The title thus rather understates its content.

The story is told largely in chronological order in seven chapters, with a foreword by HRH the Princess Royal, the Chancellor of the University of London, and an afterword by the former Dean of the School and current Vice-Provost for Education at UCL, Anthony Smith. Each chapter describes a distinct phase in the School's history and is sub-titled with an apposite quotation. Chapter 1 covers the early period from 1841 to 1861, with Chapter 2 covering that from 1862 to 1895. Chapter 3 takes the story into the twentieth century, covering the period 1896 to 1926, whilst Chapter 4 takes us to beyond the Second World War, from 1927 to 1948. The remaining three chapters cover the post-war period; Chapter 5 from 1949 to 1960, Chapter 6 from 1961 to 1986, and Chapter 7 the final period from 1987 to 2012.

Themes which run across most chapters include the student experience, the building itself, teaching and research. Others include the role of women, examinations, and relationships with both the Pharmaceutical Society of Great Britain and the University of London. Daily life at the School is covered, including sports and social activities. There are also regular references to developments in pharmaceutical education in other parts of the country. The impact of both the First and Second World Wars is considered, as is that of the earlier Crimean War in 1853-6.

At the beginning of each chapter is a list of milestones for the period, under six headings; popular culture, London life, national news, the wider world, drug developments and pharmacy milestones, although for some reason pharmacy milestones are omitted from Chapter 2 and popular culture from Chapter 5. An appendix helpfully provides a chronology of pharmaceutical qualifications and courses at the School from 1841 to 2012.

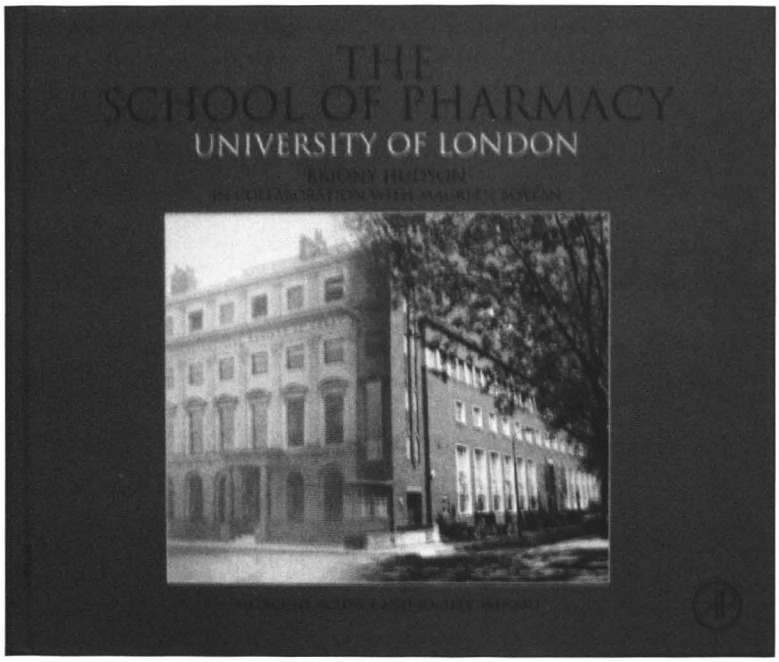
Regular quotations from the students' magazine the *Square Chronicle,* which first appeared in 1912 and continued until 1988, provide a regular source of gentle humour, vividly illustrating the timeless irreverence and humour of the student body which has been a feature of the School throughout its history. The study of drugs of natural origin is a regular topic of comment. The first edition of the *Chronicle* reported that 'it is rumoured that botany lectures are no longer what they were. Gone are the days when sponges and calabar beans used to hurtle across the theatre ...' WH Allen wrote in 1913 that 'botany lacks the explosiveness of chemistry and its entrancing uncertainty. The chemical student mixes things in a test tube, applies heat, and hey presto, he is on his back with his eye-brows and other face trimmings burnt off.'

The comfort, or lack of it, of seats in the lecture theatres was another recurring feature of student comment. In 1922 the *Chronicle* found it necessary to offer the following advice: 'students, when ordering new suits, would be wise in having two or three extra pairs of trousers, as the continual shuffling about, trying to find a soft spot on a hard seat, does the lower portion of one's apparel no great amount of good.'

Pharmacy generally had an enlightened view of the entry of women to the profession, although early impressions of this development are enlightening. The first lady to attend lectures was Elizabeth Garrett

Book review continued from p 21

Anderson. Michael Carteighe, who went on to become the Society's president, was a student at the School at the time. He later described the thoughts of the male students at the time about her attendance; 'when once a lady comes into a class she means to take prizes, and I am afraid to say we were selfish enough to think of that rather than anything else.'



In 1861 the Council passed a formal resolution banning the attendance of women, and in 1868 the Society's president, G.W. Sandford, announced that a new member of staff, Mr Brady, had agreed to deliver an inaugural address. 'He would probably say something about the importance of pharmacy' he suggested, but hoped that 'he would not draw so glowing a picture as to tempt ladies into the profession.' Nevertheless, ladies were tempted in, and by the time of the first compulsory register in 1869 there were 223 female pharmacists. In March 1920, almost half the students studying for the Major examination at the Square were female. The fears of the male students about female students taking all the prizes were clearly well-founded; by 1925 there had been five female winners of the Pereira Medal, seven Redwood scholars, five Jacob Bell scholars and no less than fifteen female Burroughs scholars.

On most pages, the core text is surrounded by a large variety of other material. There are large font quotations on most pages, usually but not always taken from the text on the same or an adjacent page. The book is liberally sprinkled with mini-biographies of some of the people and School alumni who have shaped not only pharmacy education in Britain but also the wider profession and practice, amongst whom are included the distinguished editor of this journal. As well as these boxes an assortment of timelines, illustrations, photographs and cartoons appear on most pages. For the serious reader these are something of a distraction. Which do you read or look at first? This reviewer opted to read just the text from beginning to end first, before going back to look at the boxes and illustrations. At this point of course many are no longer in context.

The book is large, heavy and rather unmanageable when not read on a table top. It is beautifully produced, in a landscape rather than portrait format. The publishers clearly decided that the main market for the book was alumni of the School and as a coffee table adornment. This has dictated the style and layout of the book. The format also dictates the exclusion of detailed notes and references; the publishers have opted for a book which is only lightly referenced, and neither footnotes nor endnotes are provided. A key list of sources is given in an appendix at the end, along with suggested further reading; however, it is acknowledged that this is not a comprehensive bibliography. Regular general references to the *Pharmaceutical Journal* and the *Chemist & Druggist* are given in the text. However, the serious researcher may still have some difficulty in tracing the exact source of a particular quotation or event mentioned in the book. The book is comprehensively indexed.

The book has been extensively researched, and it is written in an engaging and entertaining style. The authors and publishers can be truly proud of a job well done. It will be of interest not only to past and present students and staff of the School, but to all those with an interest in the history of pharmaceutical education in particular and in the history of pharmacy more generally.

Dr Stuart Anderson

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PHARMACEUTICAL HISTORIAN

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British Society for the History of Pharmacy
Q House, Troon Way Business Centre, Humberstone Lane,
Thurmaston, LEICESTER LE4 9HA

Founded 1967

British Society for the History of Pharmacy

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Tel: 0116 274 7355, Fax: 0116 274 7365, Email: bshp@associactionhq.org.uk
Website: www.bshp.org

The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

BSHP seeks to act as a focus for the development of all areas of the history of Pharmacy, from the works of the ancient apothecary to today's ever changing role of the community, hospital, wholesale or industrial pharmacist. Membership is open to all interested in the aims of BSHP.

Aims

Promotion of historical studies related to pharmacy.
Advancement of knowledge and propagation of understanding of the history of pharmacy.
Publication of the research work of pharmaceutical historians.
Preservation of pharmaceutical artefacts and historic pharmacies.
Support for the work of relevant museums and offering advice on establishment of other pharmaceutical exhibits and on the preservation of pharmacies.
Co-operation with related professions and local historians on medico-pharmaceutical topics of mutual interest.

Pharmaceutical Historian

The *Pharmaceutical Historian* has been published since 1967, at first intermittently, but on a regular quarterly basis from 1972. Issues generally comprise 16 to 28 pages and cover.
An **index** for the years 1967-1995 was published in 1998, for 1996-2000 in 2000, for 2001-2005 in December 2005 and for 2006-2010 in December 2010. They can be viewed on the website.
Papers, short communications and letters in English on any aspect of the history of pharmacy are welcome and should be sent to the address above or by email to *ainley.wade @easynet.co.uk*
Any illustrations are converted to monochrome for printing. Further details of requirements can be found on the website *www.bshp.org* under Publications.

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Visits to places of historic interest, museums, collections, botanical gardens, etc.

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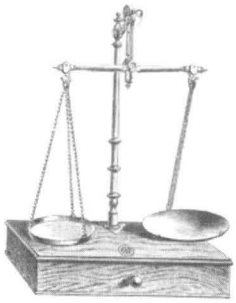

PHARMACEUTICAL HISTORIAN

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Contents

Diary

Please note that evening meetings in 2014 will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise stated. The RPS will be moving in **2015** to 58 East Smithfield, London E1W 1AW, near St Katharine's Dock, Tower Bridge and Tower Hill Underground Station. Details will be provided in good time.

Monday 7 July 2014
Visit to Royal Holloway University of London Egham, Surrey, TW20 0EX. Details have been sent to members..

Monday 6 October 2014
'Galen' by Vivian Nutting. Lambeth, 5.30 pm.

12 November 2014
Joint meeting with Aston Pharmacy School at Birmingham. 'Nicholas Culpeper' by Dr Barry Strickland Hodge. Details later.

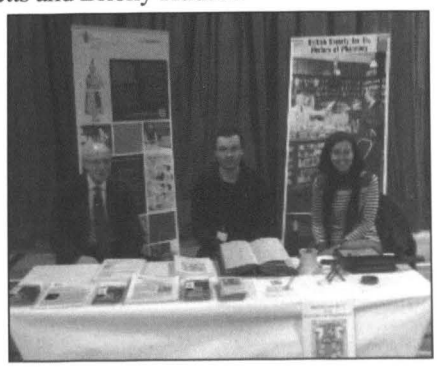
British Society for the History of Medicine

The next biennial Poynter lecture will be held on Wednesday 15th October 2014 at 6.00p.m at The Wellcome Building Conference Centre, 183 Euston Road, London. 'Preaching, Politics and Philanthropy: The Quakers in Pharmacy 1650 to 1900' will be presented by Dr Stuart Anderson. Members of BSHP are affiliated to the BSHM. Registration to attend the lecture is from http://www.bshm.org.uk/PoynterRegistration.asp

BSHP Conference 2015

The 2015 Conference will be held from Friday 27 March to Sunday 29 March in Sunderland. The cost will be held at £300, as this year.
The Conference will be at the Best Western Roker Hotel, Roker Terrace, Sunderland, Tyne And Wear, SR6 9ND. This is a sea front hotel about 1 mile from the city centre.
There will be no pre-arranged activity for Saturday afternoon but Sunderland Wintergardens have an interesting museum or you can visit the National Glass Centre. The hotel lists a golf course 3 miles away for those who feel energetic. The Washington Wetlands Centre is about 10 minutes drive away.
The main theme will be *'The Apothecary'* to commemorate the Apothecaries Act of 1815 but as the national commemoration of WW1 continues until 2018 papers or posters on either topic will be welcome together with contributions on pharmacy topics relevant to the North East and Sunderland.

British Pharmaceutical Students Association Conference 2014. Members of BSHP provided a stand at this year's student conference. *Below*: Trevor Whaley, John Betts and Briony Hudson



Teaching Pharmacy in Malta 1676–1990s: Part I

John Joseph Borg PhD
Sliema, Malta

Pharmacy education throughout the centuries has been in continuous evolution. It therefore follows that shifts in the subjects studied in pharmacy at University are expected to parallel the needs of the practice of pharmacy at the level of the community and hospital. The course of pharmacy in Malta is thought to have started in 1674. This two-part article reviews some of the developments in Maltese pharmacy education from 1674 to the 1990s and tries to tease out trends in pharmaceutical education over the centuries.

The teaching of pharmacy in Malta from 1676 to 1771

Grand Master Nicholas Cottoner will always be remembered in the history of medicine in Malta for establishing the School of Anatomy and Surgery at the Holy Infirmary in 1676. It is also possible that a course of pharmacy was established that same year in the School. Pointing in this direction is the fact that the first director of the School of Anatomy and Surgery, Dr Giuseppe Zammit, was also the lecturer in botany. As the first person to teach chemistry in the school, he set up a botanical garden at his own expense, in the ditch of St Elmo, where *spece nostrali* (native plants) and exotic plants were grown to teach chemistry and botany.[1] Through his extensive research in chemistry, Dr Zammit was able to give experimental demonstrations on chemical composition and pharmaceutical preparations to students during his lectures.[2] These were most probably the first teachings on pharmacy based in Malta. Among the various chemical and pharmaceutical compounds he used to prepare was sodium sulphate, which would still, in 1886, be known in Malta as Zammit's Salt.[3]

One of Zammit's students, Dr Fillippo Cavallini, drew up a list of important native medical plants, from which pharmaceutical preparations could be made. This list was compiled in a book entitled *Pugillus Meliteus, seu omnium herbarum in Insula Melita ejusque districtis enascentium*, which was published in Rome in 1689. This book was attributed to Dr Zammit, and was described as a written account of his teachings of pharmacy and botany during Dr Cavallini's student years at the Medical School.[4]

It is generally believed that Zammit, with the help of other assistants, lectured in pharmacy, surgery, and the Natural Sciences. One of his assistant lecturers was Dr Giuseppe Farrugia, his successor as director of the School of Anatomy. Unfortunately, Dr Farrugia never wrote anything about his daily activities. Dr Zammit's notes have also gone missing, and because of this, the exact number of professors lecturing at, and students attending the course of Pharmacy during the years 1676 and 1720, are not known. Thus, due to the limit in available documentation about the School of Anatomy and Surgery throughout this period, little is known about medical and surgical education, let alone pharmaceutical education.[5]

In 1723 Dr Henin replaced Dr Farrugia as the director of the School of Anatomy and Surgery. In 1729 the latter post was changed, and the chief pharmacist of the Holy Infirmary was appointed instead. Pappalardo claims that 'this was achieved as a consequence of a set of internal disciplinary rules for pharmacy students which were laid down on a chirograph on 17 December 1729'.

These regulations stated that:

1. Apprentices were not allowed either to leave the premises, or absent themselves unnecessarily from any lecture regarding their profession. Lectures included practical demonstrations and theoretical concepts.
2. Two apprentices had to be always present at the pharmacy of the Holy Infirmary night and day.
3. A person could practice pharmacy only if he passed the final examination in Pharmacy.
4. After passing the examination no pharmacist could practise the profession in Malta and Gozo unless: (i) he did not work for six months in the pharmacy of the Holy Infirmary, and (ii) obtained the approval of the chief pharmacist of the Holy Infirmary.
5. Anybody breaking these regulations more than twice was expelled from the profession and could not be re-admitted.[6]

Before being admitted to the course of studies in pharmacy, candidates ('*perserveranti*') had to be approved by the chief pharmacist of the Holy Infirmary. This approval was determined by the students' knowledge and education. These requisites are not clearly known; what is certain is that students had to have a reading and writing knowledge of Latin.[7] In 1771, two years before Grand Master Pinto's death, the School of Anatomy and Surgery became part of the *Università degli Studi a Malta* (University of Malta) under the Faculty of Medicine and Surgery,[8] where lectures in Anatomy, Surgery, and Medicine were given by doctors[9] and surgeons.[10] The pharmacy course, for all intents and purposes, was held at the dispensary of the Holy Infirmary, and therefore pharmacy students had to attend the hospital pharmacy for their education. They were given on-site experience of day-to-day activities in a hospital pharmacy.

After undergoing the course of studies and taking an examination, successful candidates were granted a Diploma in Pharmacy by the Chief Medical Officer and the Medical College, in the Grand Master's name.[11]

The teaching of pharmacy in Malta in the nineteenth century

During the first two decades of the nineteenth century, students were examined by the *protomedicus,* who issued a certificate of proficiency.[12] On 24 March 1821, the Medical Council was constituted and the duty of issuing these certificates was devolved. This Medical Council was the forerunner of the Medical Board found today.[13] The Faculty of Medicine and Surgery appointed the following professors to instruct pharmacy students

during the 1830s: A professor of botany, who was in charge of the running of the Botanical Garden, and lectured also in natural history and jurisprudence. A professor of organic chemistry, practical chemistry and *materia medica*, whose lectures were accompanied as often as possible by experiments in the laboratory.[14]

On 19 February 1834, the following notice appeared in the Government Gazette:

> The professorship of chemistry is now vacant, the Council of the University hereby gives notice, that a concourse will be held for filling up the same on Tuesday the 25th instant, and on such succeeding days as may be required.
>
> The Council requests, therefore, such gentlemen, as intend to become candidates for the appointment, to call at the office of the University any day from the 20th to the 24th instant inclusive, between the hours of 8 and 11 in the morning; to inscribe their names, and be informed of the conditions of the election, as laid down by the regulations of the University.
>
> University, Valetta, 17th February 1834,
> E. Canonico Rosignaud, *Rector*.[15]

On 25 February 1834, the Medical Council held a meeting at the University of Malta, Valletta, to discuss the employment of the Pharmacist Giuseppe Fenech and of Dr D Aquilina, as instructors of Chemistry at the University. The following day, Fenech and Aquilina both had to sit for an examination to assess who was the better candidate for the job. The question they had to answer was one from a set of questions each member of the medical college submitted prior to the exam. The examination question was then extracted from an urn.

The examination question the two candidates had to answer, in the five hours between 10.30 am and 3.30 pm was: "Who discovered morphine? What are the constituents of morphine? Its properties and characteristics? What reactions occur with carbonic acid, vinegar, *solforico idroclorico*, *vitrico tartarico*? What are the general characteristics of morphine salts?". The pharmacist Giovanni Fenech felt sick during the exam, and at 11am asked the Rector to be exempted due to his weakness of memory. He was exempted, and only Dr D. Aquilina finished the examination. The following day an oral examination was held for Dr Aquilina, the only candidate left. This oral examination lasted for three quarters of an hour. Dr Aquilina was then employed as professor of chemistry at the University.[16]

In February 1835, a proposal was made by the Medical Council[17] that pharmacy students had to sit for the following exams during their course: during the first year, chemistry, botany, and natural history; during the second year, pharmaceutical chemistry and pharmacognosy; and during the third year, pharmacology, practical chemistry and botany. This proposal throws some light on how the pharmacy course was conducted, and on what pharmacy students used to study prior to 1838, when the statute of the university established the way in which the course of pharmacy had to be carried out.[19]

To be admitted into the course of pharmacy in 1838, students had to conform to the educational standards required by the Faculty of Medicine and Surgery. That is, they had to present a Diploma as Master of Philosophy and Arts obtained from the University, or produce a certificate of approval obtained from the Faculty of Philosophy and Arts. This certificate was only issued if the student passed examinations in Latin, Italian literature, English composition, elocution and literature, elementary mathematics and physics. If the student did not have the above requisites, then he had to sit for an examination set by the relative professors of the Faculty of Philosophy and Arts, in the presence of the Rector, where he had to show proof of his knowledge in the subjects mentioned previously.

In 1838, the course of pharmacy was conducted over a two-year period. During the first year, pharmacy students had to study natural history, botany, and general chemistry; in the second year, they had to study practical medicinal botany, pharmaceutical chemistry, and *materia medica*. They also attended the pharmacy and the laboratory of the Civil Hospital for practical work but they could have also attended private pharmacies. The special council of the Faculty of Medicine regulated the examinations set, and passing all exams entitled the student to obtain his certificate.[20]

On 13 November 1859, a law was passed in Italy to regulate all University courses. From that day, pharmacy came to be offered as a course in the Faculties of Medicine and Surgery, and, as in Malta, it led to a diploma. The topics in Italian pharmacy courses were similar to the ones studied in the Maltese pharmacy course during the nineteenth century. These were: botany, chemistry, pharmacy practice and mineralogy. In 1862, the Matteucci regulation was passed in Italy, and the course of pharmacy was no longer offered by the Faculties of Medicine and Surgery. Instead, schools of pharmacy were established and the course of pharmacy in Italy became a three-year course.[21]

For forty-nine years no modifications to the local pharmacy course were made, until the promulgation of the University statute in 1887, when practical pharmacy was introduced in the second year of the course. The course was now set as follows: during the first year organic chemistry and practical chemistry were studied; the aim of these lectures was to give students practice in the manipulation of the chemical techniques used in the preparation of medicinals. During the second year *materia medica*, medical botany, and practical pharmacy were studied. Practical pharmacy had to be carried out at the dispensary of the Central Hospital or at any other pharmacy approved by the Special Council[22] of the Faculty of Medicine and Surgery.[23] Towards the end of the nineteenth century, many books on pharmacy were available for purchasing in Malta. Most of them were in Italian, but Maltese students attending University had no problem understanding them, as certificates in both Italian and English Language were required to enter University.

In 1887, students who wished to enter the pharmacy course had to have matriculated and passed the examinations on the subjects required for admission into

the Faculty of Arts. Only candidates who passed the examination in the subjects studied during the first and second years, before the Special Council of the Faculty of Medicine and Surgery, were given the warrant of apothecary.[24] The last modification in the pharmacy course during the nineteenth century occurred in 1889, when practical pharmacy was extended over the two years of the course. Also, before sitting for their final examinations, students had to produce a satisfactory certificate of their regular attendance at such a practice.[25]

Throughout the nineteenth century students at University had to pay for their tuition and also for the examinations they undertook. In 1898, regular students had to pay 6 pounds per annum for the entire course, and a fee of 10 shillings per annum for laboratory work; while the annual examination fee for courses in the Faculty of Medicine and Surgery was of thirty shillings.[26]

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Endnotes and References

1. Gulia, G. *Cenni Storici dell istruzione Superiore principalmente della scuola Medica nei tempi dell' Ordine*. Malta: University Library, 1886: 7.
2. Reference 1: 7.
3. Cassar, P. *Medical History of Malta*. London: Wellcome Historical Medical Library, 1964: 586.
4. Reference 1: 7.
5. Reference 1: 8-10.
6. Pappalardo, I., *Storia Sanitaria Dell' Ordine Gerosolimitano Di Malta, Dalle Origini al Presente*. Rome, 1958: 368.
7. Reference 3: 497.
8. Note that the University had been established in 1769, and lectures in Medicine were already being given by the *Accademia Maltese*. This academy was made up of various other academies founded by the following Grand Masters Zondadari (1720), Vilhena (1722), Pinto (1741), De Rohan (1775). The reason for their foundation was to keep up the standard of the medical profession in Malta. Lectures were given by doctors and surgeons of the Holy Infirmary in the morning so as not to coincide with the lectures of the school of Anatomy and Surgery which were delivered in the afternoon.
9. Reference 6: 233-234.
10. Reference 1: 7-19.
11. Scicluna, H P. Building and Fortifications of Valletta. In: Macmillan, A (ed.) *Malta and Gibraltar*, London: W H & L Collongridge, 1915: 213.
12. The *protomedicus* had to issue this certificate of proficiency, according to a Government Notice published on 18 June 1814.
13. Reference 3: 498.
14. University of Malta. *Fundamental Statute of the University of Malta.* Malta: Government Printing Office, 1838: 40-46.
15. *M(alta) G(overnment) G(azette)* 1834 February 19; 1204: 63.
16. *A(rchives) of the U(niversity) of M(alta)*, No. 11, (1833-1838): fol. 4.
17. From 1833-1838, the Medical Council was composed of: the president (the Rector D. Emanuele Rosignaud); the following members: Dr Gavino P. Portelli, Dr Costantino Schinas, Dr Stefano Zerafa, Dr Agostino Bonnici, Dr Gaetano Aquilina, Dr Luigi Gravagna (Head Doctor of the Department of Police), Dr Salvatore Cutajar (Doctor of the Civil Hospital), Dr Salvatore Bardon (Surgeon of the Civil Hospital), Dr John Liddle (Doctor of the Naval Hospital), Dr Nicolò Randon and Dr Jommaro Chetcuti. Duties of the Medical Council included preparing the prospectus of the course of pharmacy; deciding the examination questions; and interviewing job applicants.
18. Reference 16.
19. Reference 16.
20. *Fundamental Statute of the University of Malta.*, 1838: 40-46.
21. Gaureschi, I. Legislazione Farmaceutica. In: Gaureschi, I. (Ed.) *Commentario della Farmacopea Italiana e dei medicamenti in generale.* Torino: Unione Tipografico-Editrice, 1897: 3460.
22. The Special Council was composed of the Director of Education presiding, the Professor Of Descriptive Anatomy, Histology, and Pathological Anatomy, The Professor of Physiology, Pathology, Therapeutics, and Clinical Medicine, the Professor of Surgery and Clinical Medicine, and Midwifery, the Professor of Medical Botany, Hygiene and Public Health, and of Forensic Medicine, the Professor of Organic Chemistry, Practical Chemistry and *Materia Medica*, and examiners of the Faculty.
23. University of Malta. *Statute of the University of Malta,* Malta: Government Printing Office, 1887: 11-15.
24. Reference 23.
25. Reference 3: 498.
26. University of Malta., *Statute of the University of Malta,* Malta: Government Printing Office, 1898: 30.

Possible sources of therapeutic stone powder from North West Europe

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Scratch marks on building stones: nature and distribution

The church of Sint Nicolaas, parts of which date back to the 13th century, in the Dutch village of Denekamp (situated in Twente, near the German/Dutch border), like many others in the region, is made of Bentheimer Sandstone. A number of deep, parallel vertical grooves cut in in the shape of a boat have been scratched into the walls of the church (Fig. 1). The Plechelmuskerk in Oldenzaal,[1] which dates back to the 12th century, in the same region, possesses a similar set of strange grooves carved into its walls (Fig. 2).[2] Scratch marks such as these on building stones, especially those of older churches, seem to be a phenomenon spread widely through the Netherlands, Germany and Belgium, with further examples also known from France and Britain. The background survey completed for the preparation of this paper has so far documented over 210 sites displaying such scratch marks.[3]

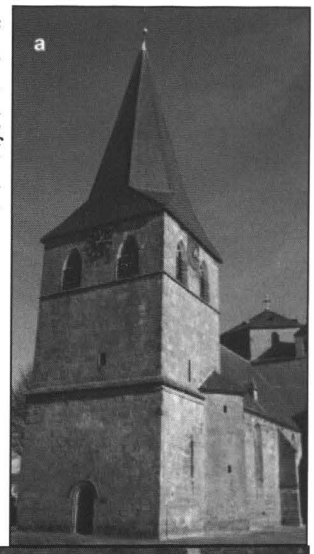

Figure 1. (a) Sint Nicolaas Church (Denekamp, Netherlands); (b) scratch marks in the Bentheimer Sandstone which makes up the walls of the church.

The marks themselves (Fig. 3) can be divided into three rough groups: (1) long (15 cm to 30 cm), narrow and shallow (circa 3 mm) grooves; (2) shorter (10 cm to 20 cm long), deeper (up to 5 cm deep) grooves scratched in a boat-like shape; (3) spherical hollows (cups or wells) measuring up to 10 cm in diameter and 7 cm deep.

Figure 2. (a) Plechelmuskerk (Oldenzaal, Netherlands). Parts of the church belong to the 12th century; (b) scratch marks in the Bentheimer Sandstone which makes up the walls of the church.

Churches and other buildings are usually constructed of local building stones which vary in type according to the underlying geology, ease of accessibility and extraction, and physical characteristics. In the area under consideration, scratches are particularly common in a wide variety of Triassic, Cretaceous and Tertiary sandstones, and soft 'marl' from Limburg and its environs. Harder lithologies such as Lower Carboniferous limestones have received limited attention, the scratch marks being nearly always small, narrow and shallow. In a few rare cases, marks have been made in igneous rocks: tuffs are consolidated, water-lain volcanic ashes and, being soft, have been worked to give long, deep marks as in various sandstones and 'marl'. Basalt is a hard intrusive rock displaying scratch marks similar to those in Lower Carboniferous limestones.

Most scratch marks have been produced on the external walls of churches. The internal walls have also been worked in this way, with scratches found on the inner surfaces of structural walls, on pillars, near the confessional box and beside the font. Outside the church, scratch marks have been found on a limited number of gravestones and roadside crosses.[4] In a few locations they are present on smooth natural rock surfaces. At several localities, some scratch marks (though, interestingly, not usually all of them) have been filled with cement, possibly by church authorities seeking to protect the walls.

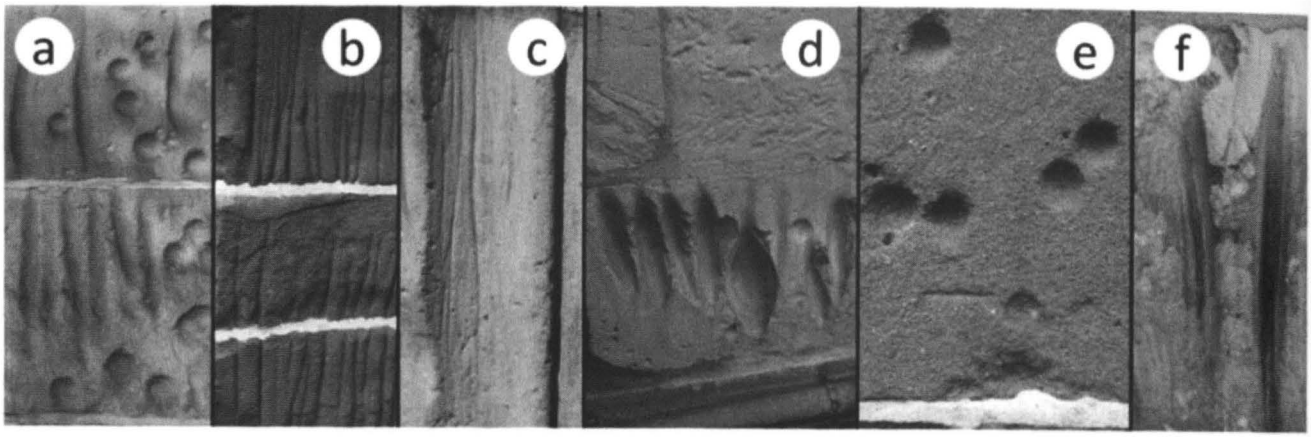

Figure 3. Scratch marks with different morphologies.
(a) Evangelisch-reformierte Kirche in Veldhausen (Germany): cups and grooves with a boat-like shape;
(b) Abdij in Averbode (Belgium): long, narrow and shallow grooves;
(c) Evangelisch-luth. Kirche in Schüttorf (Germany): long, narrow and shallow grooves;
(d) Sankt Jakobikirche in Goslar (Germany): grooves with a boat-like shape;
(e) Sint Eustachiuskerk in Zichem (Belgium): cups;
(f) Martinuskerk in Eijsden (the Netherlands): grooves.

There are some unusually specific choices for the locations of some groups of scratches. The sandstone castle of Bad Bentheim in Germany has two entrance gates with grooves confined to the inner gate. This particular wall was chosen because it was shared with a small chapel on the other side. Schloßberg Klippen is a sandstone outcrop in the German town of Quedlinburg. The rocks form the foundations of the Schloßkirche St. Servatius. In this case, the rocks of the sandstone outcrop are scratched. Why climb up to the church when you can gather the stone powder from the same rock type at its base?

Some grooves and cups have been produced on the walls of secular buildings, many of which can be shown to have had past associations with the church. They have also been found in a few old town houses and town gates. One interesting secular example is a scratched sandstone porch dated to 1618 and attached to a blacksmith's house. The blacksmith was a high status profession, members of which were considered to be wise men in German paganism.

Scratch mark origins

A number of different explanations have been given in the literature for the origin of the grooves;[4] most can be refuted, leaving one explanation which we believe to be the most plausible: obtaining stone powder for healing purposes.

1. Grinding blades of weapons

According to this explanation, somewhat loosely rejected by some previous authors, knights and other warriors ground their weapons on the stones (such as walls) of religious buildings so that they and their weapons would be blessed with success in battle and a safe return home. This idea is rejected because the depth, boat-like pattern and short length of the grooves would have been impossible to produce with the blade or edge of a sword, large knife, spear, halberd or other similar weapon. Long, narrow and shallow grooves would have been difficult to produce in this way. Accessibility is also a problem: most grooves are located in places where it would have been uncomfortable to grind a weapon - the edges of porches, near buttresses or just above the ground where grinding a weapon here would cause injuries such as grazes or back pain. Furthermore, the sharpening of knives and scythes on grindstones produces marks which are completely different to the grooves described above.

Scratch marks on British churches, such as those at St Dunstan's Church, Mayfield, East Sussex have sometimes been ascribed to military men sharpening their arrows against the wall. It has been asserted that, following the Black Death, a law was passed requiring men of military age to practice archery on a Sunday afternoon. This is rather an overstatement; it is certainly true that in the *Statutes at Large and of the Chronological Index to the Statutes*, an Act was passed on 4th February 1512 requiring that 'All Sorts of Men under the Age of Forty Years shall have Bows and Arrows, and use Shooting', a law made perpetual in 1514 and restated in 1541, but large sections were later repealed by Queen Elizabeth I. The use of a Sunday for practising does not seem to have been stipulated.

2. Resting weapons against the walls of the church

This hypothesis suggests that, because weapons were not allowed to be taken into church during worship services, resting them against the church wall produced scratch marks in (long) horizontal rows. This suggests that weapons must all have been of the same length and kind (i.e. only swords, only spears, only halberds and so on) and that the weapons were placed on exactly the same spot each time. The trajectories, height and depth of the grooves all argue against this explanation.

3. Playing children

It has been suggested that children made the grooves whilst at play. Children certainly make scratches in the soft limestones of Limburg, usually recording graffiti like names, figures and sentiments. Children generally lack the strength and persistence to produce grooves of the type

found on church walls, being distracted by far more interesting pursuits than scratching rather nondescript lines.

4. Weathering

The results of weathering on rocks are completely different to the grooves and cusps described above, which are certainly man-made.

5. Making 'new' fire at Easter by striking or friction

Certain authors think that the grooves have a religious origin; they were created by striking 'new fire' at Easter. In Germany this practice is known as '*Samstagsweihe*' because it took place on the Saturday (Samstag) before Easter, probably as a Christianised form of the heathen fire-setting in Spring, associated with the beginning of the new growing season. In the Easter tradition, certain regulations had to be followed: the fire had to be struck outside of the church with a stone.

Sandstone and similar building stones are unsuitable for fire-setting in this way. Normally, a steel struck against a flint was used to produce sparks (small glowing steel fragments) which ignited easily combustible tinder (such as dried fungus or carbonized linen) to which was then added a fuel such as wood shavings. Blowing on the smouldering material encouraged full burning. Tinder-boxes containing the essential ingredients of this process are effectively the predecessors of matchboxes and matches. Experiments seeking to replicate this effect were unsuccessful as a sufficiently hot and durable spark could not be produced against sandstone. The depth of the grooves also argues against this interpretation - fingers and knuckles would be grazed in no time; a fresh surface would have been much more suitable.

It has been suggested that the cups were created by frictional means of generating Easter 'new fire'. This process requires a fire drill (short stick), one end of which is placed in a rough cup-like hollow (usually in a small branch) while the other end is placed vertically against a small wooden board, firmly hand-held or braced against the chest. A fire bow rapidly rotated the drill in both directions, producing a glowing carbonised dust which, when sufficient, could be used to smoulder the tinder. The rough cup-like hollow produced evolves through the process to form a diameter of 1-1½ cm.

Applying this scenario to church walls requires holding the drill horizontally so that the carbonized dust falls to the ground before sufficient is generated to which the tinder can be applied. Furthermore, most cups on church walls have a diameter greater than 1-1½ cm; some are fist-sized.

6. Projectile impact marks

On impact, bullets and other projectiles produce (small) craters on wall surfaces. Older buildings may show bullet impacts from WWII or earlier battles. Projectile impact craters are hollows with uneven internal surfaces and crumbled edges. Cups that originate from scratching, by contrast, have smooth internal surfaces and entire edges.

7. Scratching healing powder from the stones

This, the most plausible suggestion, states that people created the grooves and cups by scratching the stones in order to gather a stone powder[6] used for therapeutic purposes[7] against diseases such as the plague and typhoid fever. They won the powder not only from church walls but also from grave stones and icons. Because the powder was won from an ecclesiastical building stone as part of a consecrated place of worship its therapeutic qualities were deemed, in popular belief, to be fortified by its holy association.[5]

Therapeutic stone powders

The production of supposedly therapeutic powders by pulverising a variety of geological materials has been practised since classical times. The first century Greek physician, pharmacologist and botanist, Pedanius Dioscorides (circa 40-90AD), recorded a number of fossils, minerals, stones and earths which were used for healing purposes in his *Materia Medica*, written around 65 AD.[8] A wide range of such materials was summarised in Sir John Hill's compendious compilation for his *History of the Materia Medica* in 1751, including such lithologies as jade, pumice, Irish slate, gypsum, clays, chalk, marls, and Fuller's earth.[9] Powders produced from fossil echinoid (sea urchin) spines and belemnites were used to treat a wide range of diseases including kidney and bladder stones, whilst prehistoric stone axes[10] yielded a powder that was used to treat epilepsy and to restore domesticated animals to full health.[11]

Amongst the most popular fine-grained sediments were a huge variety of medicinal earths excavated from many European and Mediterranean countries and often stamped with seals of authenticity: the so-called *terra sigillata*.[12] Several types of *terra sigillata* have a magico-medicinal component to their efficacy because of their religious connotations. The extraction of *terra lemnia*, a widely used and extremely popular medicinal earth from Lemnos in the northern Aegean, was highly regulated; mining was restricted to a single day throughout the year (August 6th) originally a feast day for Diana, later syncretised with St Saviour's Day. The whole process from extraction to stamping was carried out under the watchful eye of the priestess or clergy, as appropriate.[13]

An even closer link with Christianity is represented by *Terra Sigillata Melitensis,* Maltese sealed earth. According to Maltese tradition, St Paul spent 3 months in a cave at Rabat, having been shipwrecked in AD 60 while being taken to Rome for trial. In an incident recorded in the Acts of the Apostles, St Paul was bitten by a viper hiding in a woodpile. The locals expected him to die, but when he survived with no ill effects they surmised he might be a god. The saint brought Christianity to the island and it was believed that the rock of the grotto in which he resided and preached was imbued with great and holy power. Rock was hewn from the walls, reduced to powder, formed into cakes, sealed and exported as a powerful medicine used to combat a wide range of diseases.[14]

Up until the 1990s the people of Heerle (Wouw municipality, Dutch province of Noord-Brabant), obtained a white sand ('*Gertrudiszand*'), which was sprinkled in the home to discourage vermin such as mice or rats. In a closely related application, believers from Prinsenbeek village, also in Noord-Brabant, obtained sand from the

church called Onze Lieve Vrouw Tenhemelopneming. According to local legend, Saint Gertrude of Nivelles (circa 621-659 AD) helped rid the village of rodents which were eating the corn. This so-called '*muizenzand*' (mice sand) was used to protect the harvest against mice and rats and Gertrude is worshipped as a patroness against these animals. On March 17, the feast-day of the saint,[15] consecrated sand from a tub at the back of the church could be taken to chase away mice and rats. According to legend, a thorn bush grew next to the church at Meldert (Belgium) where the staff of the Saint Ermelindis (a 6th century Belgian hermitess) was planted. Farmers removed earth from the spot and applied it to their fields to ensure fertility.

Gertrudis was also revered in the Belgian village of Vorst. She was asked for assistance not only against rats and mice, but also to heal wounds on the nose and lips, eczema, skin conditions, plague, mental illness and for strength when the devil tried to seduce them. Earth from the churchyard was used at home as a remedy against anything and everything; it is a small step from this practice to scratching sand from church walls.

In the Belgian village of Lembeek, the local Saint Veronus (also known as Saint Froon, a grandson of Charlemagne who died in 863)[16] was said to be able to help against conditions such as headaches, meningitis and fever. Past pilgrims crept into a pit under the grave of the saint where they collected earth in small bags which were placed under the head at night in order to ease symptoms. The pit was later closed, but pilgrims could still obtain bags with earth from the church itself.

Saint Evermarus (a pilgrim martyred by robbers at Rutten in Belgium in 700 AD) is worshipped[17] if people want to eliminate their headaches. On May 1st (Evermarus's Feast Day) earth removed from the Evermarus chapel in the Belgian village of Rutten is mixed with food and eaten. The chapel itself has flint and limestone walls, the latter bearing a number of scratch marks.

Stone dust is still used for magical and medical purposes today. A chapel in the Dutch Limburg village of Sint Gerlach is dedicated to the 12th century knight who became a Christian hermit and friend of Hildegard von Bingen. After his death in around 1170, a number of small miracles occurred at his grave. Local people and pilgrims began removing soil samples from his grave, believing them to possess a special potency. This escalated to a desire to possess direct relics, such as bone fragments of the saint. The church authorities have since formalised a replacement custom in which in a pile of consecrated limestone powder (locally called marl) is stored in a hollow beneath the tomb of the saint. A small shovel and plastic bags are provided for anyone who wants to remove some of the stone dust in order to cure sick animals, to mix with corn to deter rats and mice, to sprinkle in stables for the well-being of the cattle, or even to add to soil to improve crop growth. In another example, consecrated earth can still be obtained from the cemetery at Hakendover, a Belgian site of medieval pilgrimage. Also, the Camillian monastery at Vaals (Dutch province of Limburg), now lost, used to sell stone powder as a medicine.[18]

Parishioners at Sint Catharinakerk in Montfort (Dutch province of Limburg) have special reverence for Saint Anthony the Great (circa 251-356). A long-held tradition involves large bins of consecrated sand being stood in the church next to a statue of the Saint and made available to believers who wanted to sprinkle it in their stables and on their fields. The practice is still undertaken today: the sand is obtained from local building suppliers and blessed by the priest ready for use!

At Birkheim über Kastelaun (Germany) there is an altar, the stone powder from which is reputedly beneficial for rapid growth in farm animals. Extraction of stone powder from the altar became so extensive that its very survival was threatened. On being informed that 'normal' gypsum could be used for the same purpose, the farmers agreed to obtain their powder from other sources.[19]

The use of stone chips and powders was sometimes reinforced by the recitation of secular or religious charms. Two such German examples are as follows:

> When a spell has been cast on somebody he should go to a conciliation cross (a memorial to somebody who has been killed) in the field. There he should walk around the cross three times beginning from the left side. While doing this he must say the name of the Father, the Son and the Holy Spirit. After this he must strike a piece of stone from the cross and throw it in running water whilst saying: I throw you in this stream so that all sorcery and misfortune stream away and I can resist the one who did this to me.
>
> At the stroke of midnight you should go with a white tablecloth to a boundary stone that separates three parcels of land. There you should hit three pieces of the stone onto the table cloth while saying the name of the Father, the Son and the Holy Spirit, and then you must go to running water. You also need the urine of a sick person. Make stone powder of the three pieces of stone. Put the urine, the powder and some of the water from the stream in a glass and let the sick person drink of this. As long as the sick person is drinking you should say: As certain as Jesus Christ died on the cross, it is just as certain that you will not die.[20]

It is obvious from the discussion above that stones with ecclesiastical and saintly associations have enjoyed a long history of popularity as therapeutic materials. The consecrated powder worked from church buildings by the scratching action of blades along the stone surface falls into the same category, but is more the subject of an oral folklore tradition than a written one, making details rather sparse.

Powder from church walls

The use of stone powder from churches was certainly already established by the 6th century when Gregory, Bishop of Tours (538-594) stated that a little powder from the church of Saint Martin was more powerful than all the fortune tellers with their senseless tricks;[21] even scrapings from the gravestones of saints were esteemed superior to other medicines.

Stone dust was used frequently to combat kidney stones (urolithiasis) and renal colic, and was mixed with cattle fodder.[22] Supposedly effective as medicine against many diseases, the powder contains mineral nutrients including phosphorus, potassium, lime, magnesium and sodium. In

certain regions (such as the Odenwald in Germany) people not only scratched stone dust to heal toothaches, headaches and diseases of the neck but also to expel warts.[23] When applied to warts they are reported as disappearing from the hands of young girls at night when it was full moon. The stone powder could also give relief during teething.

In Hessen (Germany) and the Grafschaft Bentheim (County Bentheim) stone powder was mixed with water and then drunk as a healing draught against the plague. This practice is the origin of the terms 'Pestschaben' and 'Pestrillen' (plague grooves) for scratch marks on churches in these particular areas.

According to folklore, after scratching powder from grooves and cups the collectors ritually blew into the hollows to banish the disease. A similar practice presently, with some variation, still persists in popular belief. At Overasselt (Dutch province of Gelderland), for example, people bring small strips of cloth worn by patients suffering from fevers and tie them to an oak tree next to a ruin of an old chapel. The people believe that the tree takes over the fever so ridding the patient of the disease.

Various farmers healed their animals with sand which they had scratched from holy places, as well as spreading it on their fields to ensure fertility. Their belief in this medicine was absolute; if the animals died or the crops failed, they reasoned that the sand has probably been applied too late, or that the saints had not been praised sufficiently during the process.[24]

Sandstone powder was credited with many miraculous properties; in order to ensure full potency the powder was to be scratched from the walls during the Twelve Holy Nights (Christmastide: December 25th to January 6th). Absolute silence was required during the scratching process, otherwise the magic powder was rendered inactive.[25]

In light of the foregoing discussion, one interesting possibility is posed by some scratch marks on the face of a Sheela Na-gig (a semi-erotic stone carving or corbel on the pillars of some Romanesque Norman churches) at the Church of St Helena in the village of Austerfield in Yorkshire (Fig. 4). Considering the erotic nature of Sheela Na-gig carvings, and the suggestion by some authorities that they might be fertility icons,[26] maybe the scratches provided a powder for use in reproductive conditions – perhaps to counter infertility, amenorrhoea, sexually transmitted diseases, pre-partum and post-partum difficulties as well as problems during childbirth.

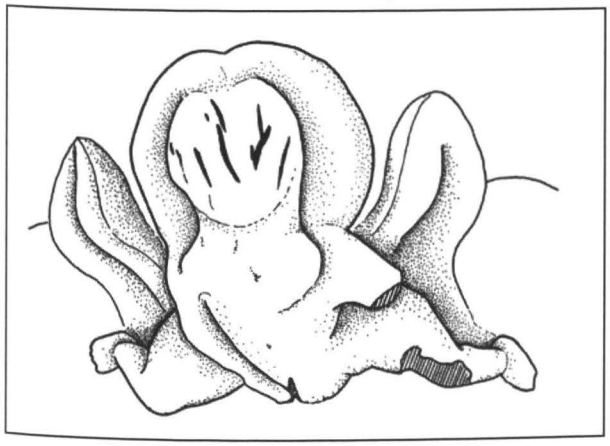

Figure 4. A Sheela Na-gig at the top of a pillar in the Church of St Helena (Austerfield, Yorkshire, UK). Line drawing made from a photograph. Note the scratch marks in the facial area.

Conclusions

The therapeutic use of powders derived from a wide range of geological materials has a pedigree that extends back to classical times. One potential source of such powders has received very little attention to date: certain building stones used both in secular and especially ecclesiastical settings in Germany, Belgium and The Netherlands. A superficial examination of churches in Britain and France suggests that scratch marks might be equally widespread in those countries too. Such buildings have systematically scratched surfaces which probably provided a supply of therapeutic powders. Stone powder extracted from church buildings was deemed to have its potential healing properties reinforced by its consecrated origins. Powders from church building stones represent one extreme of a continuum of sources of 'holy' materials, ranging from earth obtained from sites of pilgrimage to the graves and dwelling places of saints.

Scratching stone powder from church walls still takes place today. We have discovered fresh scratch marks[27] alongside older examples, for instance on a church in the German village of Schadeleben. Their presence might be related to the local landslip disaster of July 18th 2009, in which part of the nearby village of Nachterstedt moved downslope into the Concordiasee, a lake developed following the cessation of lignite mining in the region.

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Endnotes and references

1. Anderson, WF. De gleuven in de muur van de St. Plechelmuskerk te Oldenzaal. In *Grondboor & Hamer* (Nederlandse Geologische Vereniging); 1972, 1: 25-26.

2. Schuyf, J. *Heidens Nederland.* Stichting Matrijs, Utrecht, 1995.

3. Weertz, Jan & Els. *Krabsporen - Een mysterie waarover het laatste woord nog niet is gesproken.* Self-published book on CD ROM, Terschuur, 2010; Weertz, Jan & Els, Krabsporen, een bijzonder fenomeen. In *Grondboor & Hamer* (Nederlandse Geologische Vereniging) 2011; 5: 137-139.

4. www.suehnekreuz.de
5. Eitelmann, KW. Das Geheimnis der Wetzrillen und Näpchen. In *Rittersteine im Pfälzerwald*. 4. Auflage. Neustadt, 1998: 189-194.
6. Ramskou, Th. Steenschraapsel als medicijn. In *Grondboor & Hamer* (Nederlandse Geologische Vereniging) 1972; 1: 21-24.
7. Bosman-Jelgersma, HA. *Poeders, Pillen en Patiënten - Apothekers en hun zorg voor de gezondheid door de eeuwen heen.* Amsterdam: Sijthoff, 1983.
8. Duffin, CJ. Lithotherapeutical research sources from antiquity to the mid-18th century. In Duffin, CJ, Moody, RTJ & Gardner-Thorpe, C (eds). *A History of Geology and Medicine.* Geological Society of London Special Publication no.375, 2013.
9. Hill, J. *A history of the Materia Medica. Containing descriptions of all the substances used in medicine, their origin, their characters when in perfection, the signs of their decay, their chymical analysis and an account of their virtues, and of the several preparations from them now used in the shops*. London: T Longman, C Hitch and L Hawes, 1751.
10. Eitelmann, reference 5.
11. Duffin, CJ. Lapis Judaicus or the Jew's stone: the folklore of fossil echinoid spines. *Proceedings of the Geologist's Association* 2006a; 117: 265-275; Duffin, CJ. Stones for the Stone: minerals and fossils in the treatment of renal calculi. *Pharmaceutical Historian* 2006b; 36 (4): 56-60; Duffin, CJ. Fossils as drugs: pharmaceutical palaeontology. *Ferrantia* 2008a; 54: 1-83; Duffin, CJ. Fossils and Folklore. *Ethical Record* 2008b; 113 (3): 17-21; Duffin, CJ. Some early Eighteenth Century geological Materia Medica. In Reference 8.
12. Macgregor, A. Medicinal *terra sigillata*: a historical, geographical and typological review. In Reference 8.
13. Hall, AJ & Photos-Jones, E. Accessing past beliefs and practices: the case of Lemnian earth. *Archaeometry* 2008; 50 (6): 1034-1049.
14. Zammit-Maempel, G. *Seals of Medicinal* Terra Sigilla Melitensis *and Pauline Traditions in Malta.* Malta: Gutenberg Press, 2010.
15. www.meertens.knaw.nl/bedevaart/
16. Claes J, Claes A, & Vincke K. *Geneesheiligen in de Lage Landen.* Leuven: Davidsfonds / Kampen: Uitgeverij Kok, 2005.
17. Claes J, Claes A, and Vincke K. *Beschermheiligen in de Lage Landen*. Leuven: Davidsfonds, Leuven / Kampen: Uitgeverij Ten Have, 2006.
18. Kohlstock, K. Wetzzeichen an Kirchen, Grabsteinen, Kreuzen und Profananbauten in Thüringen. *Zeitschrift des Vereins für thüringische Geschichte Altertumskunde* 1933; 30: 269-277.
19. Minst, KJ. Heilige Wetzrillen. *Geschichtsblätter für den Kreis Bergstraße* 1975; 8: 221-225.
20. Losch, F. Deutsche Segen, Heil- und Bannsprüche. *Württembergische Vierteljahreshefte für Landesgeschichte XIII* 1890: 157-258.
21. Eberstadt, R. Die sogenannten Teufelskrallen an alten Bauwerken. *Korrespondenzblatt des Gesamtvereins der Deutschen Geschichts- und Altertumsvereine* 1916; 11/12: 286-293.
22. Eitelmann, Reference 5.
23. Bormuth, H. Steinmehl als Mittel der Volksmedizin. *Odenwälder Jahrbuch für Kultur und Geschichte 1996*; Erbach [Municipal Chronicle of the German town] 1995: 9-12.
24. Minst, Reference 19.
25. Minst, Reference 19.
26. Freitag, B. *Sheela-Na-Gigs: Unravelling an enigma.* London: Routledge, 2004.
27. 1st September 2009.

Auxiliary Trades: added income for the pharmacy

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This article was inspired by an article in the 1882 edition of the *Chemist and Druggist Diary*. It was headed 'Auxiliary Trades for the Chemist and Druggist'.

Then, as now, competition for sales was very keen. Chemists' stock in trade was being crippled by co-operative stores and general traders. The goods that were traditionally sold by the chemist were being sold elsewhere, such items as culinary herbs, proprietary medicines and even the selling of poisons and the dispensing of medicines. The Pharmacy and Poisons Act of 1868 regulated the sale of poisons. It also stated that:

> from and after 31st December 1868 it shall be unlawful for any person to sell or keep open shop for retailing, dispensing or compounding medicines, or to assume or use the title chemist and druggist, or chemist, or druggist, or pharmacist, or dispensing chemist in any part of Great Britain unless such person shall be registered under this Act.

The judgement in a watershed court case, namely the *Pharmaceutical Society v. the London and Provincial Supply Association Ltd*, had decreed that the act did not apply to a company and they could, therefore, carry out trading as a pharmacy.

The chemist had a dilemma. Many pharmacists had wanted to separate themselves from the less attractive adjuncts of their business such as the sale of oil and paints, in order to promote a more professional image. Now, with the Companies selling poisons and the dispensing of medicines it was necessary to find other ways of making money. The *Chemist and Druggist Diary* suggested ways in which trade could be increased and gave suggestions how these could be professionally promoted. The trades suggested in the *Diary* were not necessarily new to the chemist but were offered as a consideration for the expansion of business if not already installed.

The Spectacle Trade

Many pharmacists had additionally taken up the role of optician. It was a fruitful business but required training. The *Diary* suggested that an alternative might be to sell ready-made spectacles.

There is no branch of business which might more suitably fill a recognised department in the shop of the chemist and druggist than the spectacle trade. It is a business which it is in the highest degree important should be entrusted to educated dealers and the public are as well aware of that fact as are the ophthalmic surgeons.

Although a spectacle dealer did not have to be an oculist, it was a good idea to have some knowledge about the faults of the eyes that he was correcting. The article gives a description of the eye, a brief summary of how it works, the ageing process and things that can go wrong such as myopia or short-sightedness. It describes concave and convex lenses and the benefits of each. It warns against the possibility that difficult vision may be due to astigmatism and should be referred to a 'competent and practised person'.

At this time, measurement of the strength of lenses was a numbering system based on their focal distance in inches. This was soon to be replaced with dioptres which were based on the focal length in metres, a usual range of 1 to 5. It was suggested that the pharmacist should purchase a case of specimen lenses or 'triers', prices ranging from £2 or £3 up to £7 or £10. The range of spectacles to be stocked was dependent on the amount to be invested and the class of the customers he was likely to supply. Boxes with a dozen pairs of one quality and assorted lens strengths could be supplied by wholesalers. The chief stock would be in convex-lensed glasses. A folder or case might be included with the more highly priced spectacles. In addition a few monocles should be stocked. Industrial areas might mean a trade in goggles, and seaside resorts might benefit from coloured glasses in blue, green or London smoke, the latter being generally preferred. Blue was the best for snow-glare.

So how much profit could be made from spectacles? Iron-framed could be purchased at 2s9d per dozen. Goggles at 7s per dozen sold at 1s6d each. Spectacles bought at 20s to 30s per dozen sold at 3s6d, 5s, or 7s6d.

A good way of keeping the trade together, is to register in an indexed book, every transaction, recording the sight of the lenses sold to every customer. In cases where satisfaction is given, the customer is likely to renew his orders for the sake of his own comfort.

The Tea Trade

At first glance this seemed a strange option. But tea is a herb, we were trained in herbs, so why not sell tea? In fact it was a popularly stocked item. The simplest method of trading was to purchase ready packed tea in ¼, ½ or 1 lb packets, then add a profit margin. The cheaper alternative was to buy tea in its original packs imported from China or India, and make up his own packets and blends. He should have teas to sell at 1s6d, 2s, 2s8d, 3s and 3s3d per pound, bearing in mind that there was a standard tax of 6d per pound. Formulae for blending according to cost were suggested:

To sell at 1/6 (7½ p) per lb

1lb of China (Moning or Kaisow) siftings	6½ d
1lb of Assam broken leaf	9½ d
2lbs of mixture	1s4d

ie, 8d per lb and 6d duty gives 1s/2d cost per lb

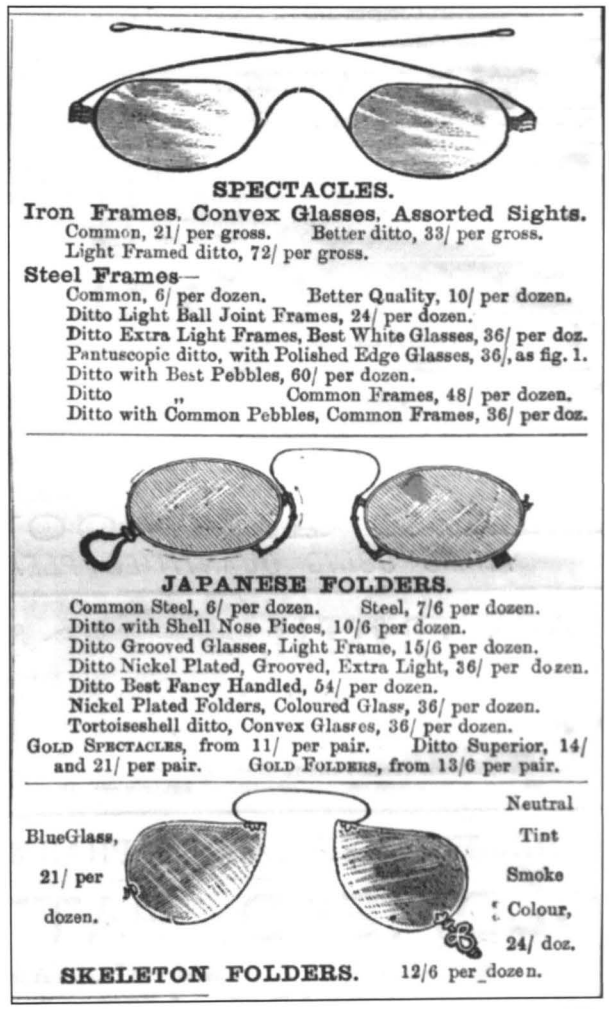

Figure 1. Spectacles - *Chemist and Druggist Diary 1888.*

Figure 2. Tea supplier - *Chemist and Druggist Diary 1883.*

That is a profit of 2d per pound! This gave the cheapest blend with siftings and broken leaves. Other formulae used whole-leaf tea.

Tea was wholesaled in chests and half-chests, the weight varying between about 96 lbs and 112 lbs per chest, according to the type of tea. The article advises on the sort of quantity that the pharmacist should invest in at the start of his trading. It also points out that the Midlands enjoy scented teas such as scented caper and scented orange Pekoe. The Midlands also drank green tea, the most

popular being Moyune Gunpowder. In Ireland they drank only Assam tea, so the chemist should not touch Java, Japan or Ceylon teas.

> In buying paper in which to wrap the tea, care should be taken not to get common paper which smells at all, as many experienced men often spoil their tea by using trashy coloured paper. Again, in the case of a chemist, the tea should be exposed to the air as little as possible, as the smell of the shop would by no means improve it.

The Wine Trade

Wine could be retailed 'by any shopkeeper who possesses a good frontage in a busy street and who has sense enough to conceal his ignorance of the subject until experience enables him to speak with authority'. There were several reasons why chemists should embark upon this trade as well as publicans and grocers, the most important being the fact that wine is prescribed to invalids and convalescents.

> Who can calculate the probable effects upon the human organism of a certain description of liquor like a trader whose youth and manhood have been devoted to analysis and synthesis?

It was necessary to find an agent. Most of the large wholesalers such as Gilbey, the gin people, had filled their books with agents in most towns. There were many small wholesalers but it was suggested that one should obtain at least five quotations. Then thought was needed about which products to stock.

> Firstly comes claret, the drink of the future, a wine that ranks with bread, meat etc as an article of diet rather than luxury. Avoid the cheapest and the most expensive as customers may prefer to buy expensive clarets from the chateau or a superior wine merchant. ... In the same category as clarets come the white wines of Bordeaux which, by ignorant persons are occasionally called white claret, a misnomer almost as glaring as it would be to speak of femoral bronchitis.
>
> Burgundy, white and red should be kept in small quantities. It is a little fuller in body than claret, and, therefore suitable for use in damp and foggy weather. It is a good tonic during the worst months: but the unhappy being who drinks it from January to December is laying the seeds of gout, against which the most eminent physicians will strive in vain.

The public knew too much about the prices of good champagnes so, just to aid with the festivities, a few cheap bottles should be stocked.

> As a pick-me-up a pint of old landed champagne is almost unrivalled in the Pharmacopoeia. Its action upon stomach and brain is almost instantaneous, especially when the former is not loaded by food and when the latter is not loaded by food, and when the latter has been injured by alcoholic excesses.
>
> To drink it at repeated intervals during a heavy repast is an act only worthy of a nation of barbarians, and Nemesis will surely follow in the shape of gastritis and general stomachic derangements.
>
> Port is being relegated from polite society to the middle and lower orders. In the winter a bottle of fruity port is an excellent remedy for a poor person suffering from anaemia.

Sherry had experienced various fluctuations in the market and was not a good bet. German wines were reasonably popular such as Hock and Moselle.

> The inhabitants of the Rheingau, where the best Hock is made are amongst the most gay, healthful and long-lived members of the human family.... Diseases of the kidney and bladder are unknown.

It was suggested that Hungarian, Italian, Australian, Californian, Greek and other minor varieties had better not be held until there was more demand for them.

Brandy was going through a bad time. The vines of Cognac were plagued with Phylloxera. As a result there was a lot of counterfeit brandy and the introduction of eau-de-vie made from potatoes. Sales were best avoided.

Petroleum

My first thought was 'a garage pump outside', but of course in 1882 there were no cars. So what was the petroleum trade?

In 1850, a gentleman named John Young from Glasgow took out a patent for the extraction of oil from Broxham shale. The heavier elements of this extraction were used to lubricate machinery and the lighter elements were run off as waste. Young's partner, Meldrum, suggested that this lighter oil might be used as a torch in collieries and designed a burner in which it could be burnt in a suitable wick and chimney. It was named paraffin and was a dark, strong-smelling oil. It soon started to replace whale oil as a lighting oil.

The Americans and Canadians had also extracted an oil that they had called 'petroleum oil' and were using medicinally. They had also distilled oil from coal which they had named 'kerosene' which was not as dark or smelly as the Scotch version.

Production rapidly increased and the *Chemist and Druggist* in 1882 commented that:

> There are now unmistakeable signs of exhaustion and prices will probably steadily tend upwards, with violent fluctuations intervening.

The price at that time for crude oil was $20 per barrel of 42 American gallons representing about 2s (10p a gallon) or 3s a gallon for refined oil.

Unfortunately Young's patent was only for the extraction of oil from shale. The word paraffin had previously been used so it could not be patented. As to the retailing of petroleum products, there was a Petroleum Act that made it necessary to hold a licence, costing 5s per year, if the products stored produced an inflammable vapour below 73 degrees Fahrenheit. If a licence was held the storage conditions also had to comply with requirements such as the distance from outbuildings, limit of stock, drawing off only in daylight and labelled with a caution label such as 'dangerous' and the name and address of the seller.

Storage was in coopered barrels. Any sign of damage and the contents had to be transferred. The barrels were lined with an eighth of an inch of glue which was brittle and could be cracked if the barrel was dropped. Tanks and containers were available for transfer.

All petroleum was now being imported from America and from the Standard Oil Company, founded by a former bookkeeper named Rockefeller. They had, by fair means and foul, established a virtual monopoly. Various products were available:

Water-white Crystal Oil ('Wheel brand') – a lamp oil that burnt with a very white light about twice as brightly as some other oils.

Lubricating Oils – two types, summer and winter. The winter oils would not freeze at 15 degrees F, as other oils would. Both oils were used in collieries, by farmers and in ironworks. They could also be used for burning by saturating torches made from rope.

Clear Yellow Oils – were virtually colourless and came in two varieties, A and B. A grade was used in cotton mills and sewing machines. B grade was a heavier oil used in machinery. It was also used, lightly perfumed, in hair oils or as a substitute for olive oil in the softening of woollen fibres.

Curriers' Oil – for leather-dressers and saddlers' use. It did not dry out or crack.

Cylinder Oils – for lubricating and rust prevention on cylinders used in machinery.

Spermatine Oils – freezing point of 12 below zero. Used by farmers.

Petroleum Spirit, Naphtha, Benzoline – solvents with very low flash points. A licence was required if stocked.

And in addition to the sales of oils, the empty barrels were very saleable.

Aerated Waters

Aerated waters were water plain or flavoured, impregnated with carbon dioxide under pressure and usually sold in strongly stoppered bottles. Many chemists were producing their own stock in the backshop or basement. It was necessary to purchase machinery to produce the aerated water and also machinery to bottle it. Another requisite would be to have mains water which should be filtered. This would be through large, plumbed-in carbon or silicon filters. The whole set up, including bottles, corks, boxes would have cost about £100 which, in those days, would have been a considerable investment. You would also need to employ someone at 25 to 35 shillings per week but this could be cut down by employing them only in the summer months. It was deemed to be a good investment with plenty of scope for development, and remember:

> every additional hundred dozen [bottles] costs less than its predecessors.

Photographic Chemicals

The year that the article on Auxiliary trades was printed was 1882. This was only 43 years after Fox Talbot's paper presented to the Royal Society when he introduced what was called the calotype process. Photography was quickly taken up and by the time of the article coated plates were in vogue. Along the way some pharmacists had tried their hand at processing but little had happened within the chemist's trade. We can see from the advertisement that chemists might stock magic lanterns that would project pictures from hand-painted glass slides, but there were no adverts for cameras and allied apparatus or chemicals although the article does mention a catalogue for specialists.

Figure 3. Petroleum - *Chemist and Druggist Diary, 1879.*

It was now suggested that, as most of the chemicals used in photography were normal stock items in the pharmacy, the chemist should promote these chemicals. They included citric acid, ammonium bromide, iodine, potassium iodide, potassium bromide, sodium bicarbonate and mercuric chloride. Much of the apparatus used would be of a scientific nature and would be available from the wholesaler and these would be useful add-ons.

The first advertisements for cameras in the *Chemist and Druggist* appeared in 1886, for tourists, bicyclists, tricyclists and others. It is interesting to see that a bicycle clip could be had in place of a stand. Presumably this was to clip the camera to the bicycle as a *stand* at that time was another name for a *tripod.* And to complete the stock a list of books were recommended for sale.

Scientific Apparatus

> Every one qualified to call himself a chemist and druggist has received a certain amount of scientific education and is sometimes credited by the public with more knowledge than he actually possesses.

By 1882 science was on many people's minds and there were many who sought to experiment at home as well as in the laboratory. The main sources of apparatus were the manufacturers, which was all right if you lived in the cities, but difficult on your local high street.

> And what a good window display – scientific goods that will attract and mystify the general public."

Figure 4. Scientific apparatus - *Chemist and Druggist Diary 1882*

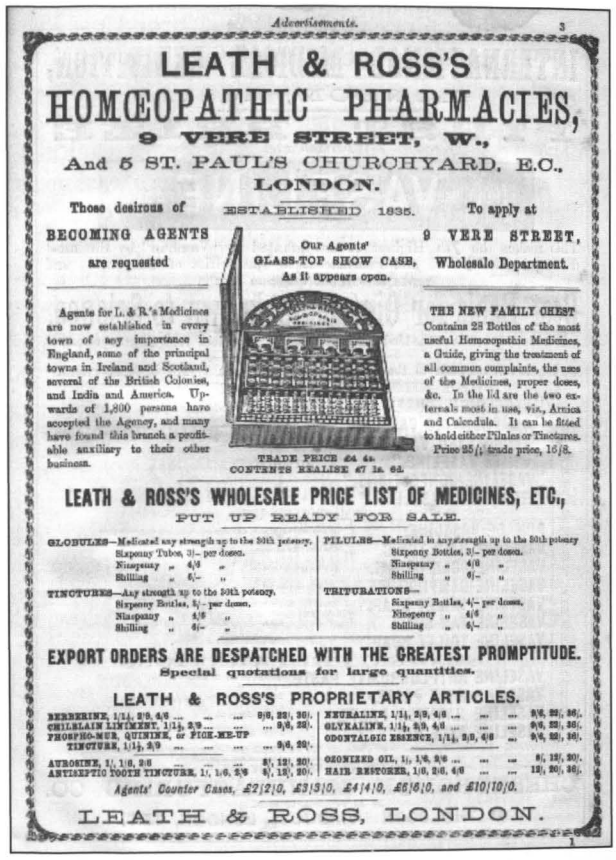

Figure 5. Homoeopathic pharmacy - *Chemist and Druggist Diary 1888.*

This included various kinds of glass apparatus, Bunsen burners, spirit lamps, test-tube stands, retort stands, thermometers, coils of insulated wire, batteries, electric bells, all items that would withstand the conditions that might spoil other stock items. It was suggested that the chemist should consider his clientele. Schoolboys would probably be the target in most towns and villages unless there were scientific institutes. Electricity was not yet on mains supply so it was important to stock gas lamps, burners and batteries. The article goes on to give a long list of items recommended to be stocked

Homoeopathic Pharmacy

> Homoeopathic medicines are now so extensively used that some intelligent equipment for this branch of the medical service is almost essential for the chemist and druggist either on a large or small scale, according to the possibilities of his district.

Homoeopathy had been invented, or should it be discovered, by Dr Samuel Hahnemann and his first book on the subject was published in 1806. By 1882 it was well developed in Great Britain.

It was not a great investment to take into stock. The manufacturers would supply a showcase full of the most popular remedies which could be sold and produce a very reasonable profit. It was possible to buy mother tinctures in order to medicate your own preparations but it was thought unnecessary unless there was a great demand. In this case it was suggested that the chemist have a separate room just for his homoeopathic work ie preparing powders, tinctures, globules and pilules and also for dispensing prescriptions.. He would need 60 to 90 mother tinctures in quantities between 1 and 8 fluid ounces (30 to 250 ml) and *The Homoeopathic Pharmacopoeia* to show how they may be prepared. The article describes the method of dilution and the strengths of tinctures that were produced and gives examples of homoeopathic prescriptions.

Conclusion

How different is pharmacy today? 130 years later, can pharmacists make a living by selling those 'traditional' chemist ranges, OTC medicines, surgical requisites, photographic items and dispensing prescriptions? Perhaps the small shop on the small high street might survive but most town centres have malls selling everything, with pound-shops undercutting everything, including OTC medicines. True, the pharmacist has taken on new roles within the NHS – Non-smoking counselling, weight loss advice, MURs etc. But the sales? Perhaps we need new entrepreneurs to show us new ways to make money.

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The Value of the Euganean Thermalism in the Treatment of Human Diseases: past, present and future health applications. From Michele Savonarola's *De Balneis in Comitatu Paduano* to innovative approaches

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The aim of the present work is to analyse solutions used in the past in order to make suggestions for modern treatment, thus revising traditional remedies that combined with innovative approaches may give rise to newer health remedies. In the *De Balneis*, Michele Savonarola from Padua, professor at the University of Ferrara and physician at the famous court of Este, describes the *Patavini* Baths and the diseases successfully treated in the fifteenth century. The text of Michele Savonarola's *De balneis*, published in 1531 was analysed in order to understand medical practices. Savonarola's *Practica Maior* (1560), Gio Andrea Della Croce's *Chirugia universale* (1661), *A System of Practical Medicine* (1840) and *Clinica del Parigino Ospedale di S. Luigi* provided essential guidelines in the analysis of the diseases described in the document. The successfully treated diseases varied and were described with meticulous attention: from those of the osteo-articular apparatus to those of the respiratory system; from gastritis to vascular mnemonic-based deficits; pain and/or functional limitations of the joints and various skin diseases. The analysis led to interesting results not only from a historical point of view, but also from the clinical, giving important suggestions for the development of novel 'optimised' approaches.

Introduction

Traditional remedies are an important source of suggestions for new remedies. The approaches to health described in historic documents, although they are far from modern rational approaches, represent the largest clinical study ever done by the human being. In recent years we have investigated the therapeutic approaches used in Ferrara, in particular against the typical illnesses of the 19th century.[1] In the present work we focused on one of the most popular traditional remedies, thermalism,[2] by studying the earliest report, written in the 14-15th century by Michele Savonarola, an eminent scientist and researcher and author of *De Balneis*, a treatise about thermalism. For the first time, the ancient acknowledged properties of Euganean thermae [spas] have been revised in the light of current knowledge.

Man has known the use of mineral substances for therapeutic purposes for thousands of years. Greeks, Egyptians, Babylonians and other civilisations knew the virtues of thermal waters. Philostratus (2nd-3rd century AD) in the *Heroicus* recalls that many wounded from the Trojan War were subjected to thermal treatments at the Baths, known as the Baths of Agamemnon ,near Smyrna, which had warm mineral waters.[3] But it was during the Roman Empire that a great impetus was given to the thermae, with the development of several stations within the Empire. A tradition continued later at the court of Charlemagne in Aachen, albeit with an obscure period, and then again in the 14th century with the recovery of the ancient baths. This latter period in history, with Savonarola, was investigated in the present work. It was only later on that the name of the town Spa in Belgium became synonymous with hot springs, maybe by derivation from the Latin word *spagere* (to scatter, sprinkle, moisten) or as an acronym from the newly coined Latin phrase '*salus per aquam*' (health through water).

The Euganean thermalism

The *Bagni Patavini*, Padua's baths, are located a few kilometres southwest from the city. They were renowned from ancient timesand known since the Iron Age by *Paleoveneti* (the indigenous people), as cited by many Latin writers.

Over the centuries the nobles and wealthy went to take advantage of the balneotherapy in the beautiful area of *Colli Euganei*, a group of hills of volcanic origin.

The nearby Padua University, founded in 1222, already had in the Middle Ages renowned researchers like Pietro d'Abano, Jacopo and Giovanni Dondi, Michele Savonarola and Bartolomeo da Montagnana, and afterwards other famous thermalists.

Savonarola's *De Balneis*

Salvatore Mandruzzato (1758-1837), professor from 1801 at the University of Padua (chair *Alle Terme di Abano*, at Abano's spa) in *Dei bagni di Abano*[4] was the first to report on Savonarola's 1440 writings in *Forensium copiosus numerus ex omnibus Italiae, ac Germaniae partibus ad sanando corpora non mediocri cum aviditate veniunt* (the baths were frequented by foreigners from Italy and Germany). Michele Savonarola (1384?-1462?), physician from Padua and grandfather of the very famous monk Girolamo Savonarola, was professor at the University of Ferrara and physician of the Este court. He discussed the virtues of thermalism in Italy in the book *De balneis et thermis naturalibus omnibus Italiae*, an incunabulum printed in Ferrara by Andrea Belfort, a French proto-typographer.[5] Savonarola was the first to mention 'seven baths' (the total number existing at the time).

In *De Balneis* for the first time Abano was recognised as Ebano. In Menguzzato's opinion, Ebano derived from the Hebrew term *aben* and *eben*, stone.

Several editions of the Savonarola's *De Balneis* were printed in Italy and abroad, also as a section of *Practica canonica. De Balneis* looks at the whole Italian territory; however Savonarola came from Padua. He declared his obvious preference, giving precedence to the Euganean baths.

> Et cum saepe mentem revolverem an extranea domesticis anteponendo forent: id mihi honestius esse vedebatur, extraneis domestica praeferri debere. Qua ex re cum Patuus sim: de balneis in comitatu Paduano à me prius agendum erit …

He wrote about the seven baths near Padua: *De balneis Ebani; De balneis Santi Petri; De balneis Domus nouae; De balneis Montis Groti; De balneis Scti Bartolomei; De balneis Sancte Elene;*and *De balneis Orthoni montis* (in Italian Abano, San Pietro, Casa Nuova, Montegrotto, San Bartolomeo, Sant'Elena, Monte Ortone).

At first, Savonarola wrote in *De Balneis Ebani* that the seven Euganean baths can be traced back to remote antiquity.

> Verùm cùm ex ipsis septem quae in comitato habentur, illud antiquis scripturis inveniam, quod apud nos de Ebano nominatur. Iuxta illud Lucani.

He mentions the verses of the Latin poet Lucanus, Nero's contemporary, that wrote about Aponus, Abano (in Lib. VII v. 193 Frafaglia's war). While sitting on the hill of Abano (which means smoky), Caius Cornelius, augur (interpreter of omens) in Padua prophesied the victory of Caesar in the war with Pompeus.

> *Euganeo si vera fides memorantibus augur: Colle sedens aponus terris ubi fumiger exit.*"

Since antiquity the Euganean baths were well known for their special virtues, as underlined by the meaning held in its name:

> *De balneis montis Grotti, sive potius Aegrotorum. Mons est ad Occidens Aegrotorum, à veteribus nostris sic nominatus: quondam his in temporibus amenitate loci aegrotantes ad balnea illi proxima proficiscentes ad eum perambulandum trahebantur.*

Aegrotus means 'the sick' in Latin, *Mons Aegrotorum* is the mountain of the sick, also attracted by the amenity of the place (*amenitate loci*).

The sources

The text of Michele Savonarola's *De balneis*[6] published in 1531 was analysed in order to understand the proposed medical practices.

Savonarola's *Practica Maior*[7](1560), Gio Andrea Della Croce's *Chirugia universale*[8] (1661), *A System of Practical Medicine*[9] (1840) and *Clinica del Parigino Ospedale di S. Luigi* (Dermatological Division of St. Louis Hospital in Paris) *ossia Trattato completo delle Malattie della pelle*[10] (Treatise of skin diseases) were used as essential guidelines in the analysis of the diseases described in the document. Particular attention was given to dermatology in view of our specific research interests.

The seven baths described by Savonarola will be indicated either complete or with abbreviations: *De balneis Ebani*, Abano (E); *De balneis Santi Petri*, San Pietro (SP); *De balneis Domus nouae*, Casa Nuova (DN); *De balneis Montis Groti*, Montegrotto (MG); *De balneis Scti Bartolomei*, San Bartolomeo (SB); *De balneis Sancte Elene*, Sant'Elena (SE) and *De balneis Orthoni montis*, Monte Ortone (OM).

Virtues of the Euganean baths

The Euganean thermal treatments currently have a proven benefit for the joints, pain syndromes, muscular atrophy and rehabilitation programs after trauma, including fractures and surgery. Moreover, the particular chemical composition of the water can help the resolution of chronic inflammatory processes. This water comes from the Lessini Mountains in theAlpine foothills. After reaching a depth of 2000-3000 metres, it flows underground through the limestone rock being enriched with minerals. Finally it reaches the Euganean hills (of volcanic origin), where it flows out on the surface at a temperature of nearly 80°C. The water is classified as salso-bromo-iodine thermal water.

Over the centuries this water's properties were carefully studied at the University of Padua. They tried to exploit all the water sources of the territory, such as the sulphurous water that emerged in Costa (Arquà Petrarca, Padua), for example.

Archduke Rainer Joseph of Austria, a Viceroy of the Kingdom of Lombardo-Venetia, and his wife were at S. Elena della Battaglia spa in 1827. The sulphurous mineral spring of Costa was much appreciated by the Archduke. The *Raineraine* was recommended in the 19th century for treatment of scrofula.[1] In *De Balneis* many and various virtues are described for different diseases. The interpretation was still that of the ancient medicine, based on humoral theories.

Savonarola's treatise for each bath is detailed, but it is not easily understandable on certain points. In particular we found difficulties in clarifying dermatological terms. There is no reference for the words' meanings, and at first the terms are unclear. The source of the terms goes back to the ancient Arabic, Latin and Greek medicine.

Vulnera et ulcera (E,SP,MG,SB), *gancrenae* (E) are easily translatable (injury, ulcer and gangrene). In other cases a more exhaustive study is required for *impetigo* (E), *scabies* (E,SB,SE), *serpigo* (E,SE), *herpes aesthiomenes* (E), *bothor* (MG), *pannus morpheae* (MG), *albaras* (MG,SE), *sanguinei violacei*, *apostemata iunctarum*, *verrucae pendentes*, *duritia* (MG) and *maculae corporis superficiales* (SE). After several attempts the interpretation proposed is listed in Tables I-VI. See Figures 1-6. p. 41.)

The use of the St. Louis Hospital Treatise is a necessary guide for a deeper understanding of the described diseases. In its text wonderful tables are depicted. Alibert[10] reported the terms used in the ancient medicine for each disease. Also commonly used by other authors: *Serpigo, impetigo* are Arabic, Latin and Greek terms; *albaras, bothor* are Arabic terms; *Herpes aestiomenes* is identified as Paracelso's *lupus vorax*.

Except for Sant'Elena, all the baths were near Abano. San Pietro is a 'mile' away, Casa Nuova, towards the

Table I. *De Balneis Ebani* e *Sancti Petri. Rub. I, II* [Illness cured in Abano and San Pietro baths].

catarrho frigido [chronic bronchitis with little or no phlegm production (dry cough)] & *humido* [acute, chronic or infectious bronchitis with phlegm production (wet cough)]
tinnitui & sibilationis antiquis [tinnitus (whistles and hiss in the ear / rhythmic noises) hearing loss up to deafness]
dolori capitis antiquo [headache]
habentibus pectus humiditate plenum ac frigiditate laesum [acute, chronic or infectious bronchitis (pneumonia, pleuritis)]
stomacho humido [ulcerative gastritis, secretory gastritis]
hydropisim habentibus [fluid retention caused by hormonal, cardiac or renal imbalances]
doloribus articulorum [arthralgia]
podagrae [gouty arthritis]
fracture restauratione [healing of bone fractures]
Vulnera [wounds] & *ulcera* [plagues and ulcers]
Ulceribus corrosiuis [traumatic ulcers, diabetic foot ulcers] & *ambulatiuis* [leg ulcers, traumatic ulcers, pressure ulcers], *gancrenae* [ischemic gangrene], *herpeti esthiomeno* [*Herpes genitalis* (HSV-2), already defined by Paracelsus as *"Lupus Vorax"*)]
serpiginem [*Herpes Zoster* with a dermatomal distribution (Figure 1, Tav.6)] & *impetiginem* [impetigo caused by *Staphylococcus aureus*]
scabiem ulcerosam [scabies complicated by scratching and superinfections (Figure 2, Tav.55)]
carbunculis [swelling (pimples or abscesses) and ulcers]

Table II. *De balneis Domus nouae. Rub III* [Illness cured in Casa Nuova baths].

Cachexia	Cachexia
Hydrope,	Hydropsy
Paralysi	Palsy

south, is a half-mile from Abano (a Roman mile, *milia passuum* – a thousand steps, where each pace or stride was two steps – about 1480 metres or 1617 yards). Even if they are close to one another, the properties of the waters are often very different anyway. Sant'Elena, however, is seven miles from the city. According to Savonarola, the various thermal bathhouses were able to promise significant benefits for treatment of the osteoarticular, neurologic, respiratory, digestive and renal-vascular apparatus, including also dermatologic diseases, especially the aesthetic. Abano and San Pietro have similar properties (Table I).

About *Sancti Bartolomei* baths (Table IV) Savonarola wrote:

> *Unde meo cum consilio vir quidam Feltrensis nomine Petraca qui nodositatem ac duritiem in genu habebat* [...] *Et inventum est in libris quondam Estensem Marchionem à podagra curatum* [...] *et dominus Aquileiensis Cardinalis totus contractus.*

That is, important people were successfully cured, such as an Este marquise (podagra), a cardinal from Aquileia (osteoarticular apparatus). Petraca is not the well known and famous poet Petrarca, who lived in Arquà, the Euganean town. Petrarca is not *Feltrensis,* from Feltre. It could not be the '*meo cum consilio,* under my advice' by Savonarola, as they were not contemporaries.

Dermatological properties are reported for all these baths, except from the *Domus nouae* and *Orthonis Montis* baths (Tables II and VI). *Montis Groti* e *Sancte Elenae* baths (Tables III and V) are characterised in particular for their application to the aesthetic field. Principal applications of thermalism to dermatological conditions range from teenage acne, all forms of eczema, psoriasis, rosaceous acne to all forms of allergic dermatitis. The use of mineral water, which aids tissue reconstruction, has also proved particularly effective in the treatment of skin lesions such as burns.[11]

Scientific aspects related to the use of thermal mud

There is evidence that in prehistoric times, the Neanderthal *Homo erectus*, imitating the behaviour of animals, which instinctively roll around in the mud to benefit from it, were using earth mixed with water to heal wounds, relieve irritation, clean and protect the skin.

This practice has been documented in various historical periods, from Mesopotamia to ancient Egypt, where special mixtures of water and clay were used to improve anti-inflammatory applications of muds.

In ancient Greece, we find the first classification in the work of Hippocrates and Aristotle, of mud and earth for healing, applied in the form of poultices to achieve antiseptic goals, for the treatment of skin problems, to help wound healing and to remove the poison from snakebites.

The practice of using therapeutic mud baths became of great importance in Roman times, as evidenced by several documents, including the *Naturalis Historia* of Pliny the Elder, which describes the properties of mud of

Table III. *De balneis Montis Grotti. Rub IIII* [Illness cured in Montegrotto baths].

catarro humido [acute, chronic or infectious bronchitis with phlegm production (wet cough)]
Sibilo tinniti, surditati ex causa frigida venienti [tinnitus, deafness resulting from degenerative causes (otosclerosis)] ...
dolores descensiones humiditatum [arthrosis]
capitis dolori antiquo [headache]
memoriam ... non ex aetate deperditam [loss of memory due to vascular impairment (but not to degenerative causes)]
pectus ab humiditatibus liberat ... asthmaticis [improvement of productive cough and asthma] ...
stomachum laxant ... stomachum frigidum [ulcerative gastritis and atrophic gastritis]
hydropisi [hydropsy]
nervos mundificant ... in paralysi ... spasmi sedant ... epilepticis [central and peripheral neurological disorders (epilepsy, paresis)]
Vulnera [wounds] & *ulcera* [plagues and ulcers]
corporis superficiem à bothor [cradle cap, seborrheic dermatitis (candidiasis of oral and enteral mucosa are not mentioned)]
ulceribus malis antiquis [inveterate ulcers]
sanguineis violaceis [ecchymosis (subcutaneous bleeding), sarcomas (Figure 3, Tav.58)]
Pannos [all other skin blemishes (superficial, flat, sine materia, and with a slow evolution) (Figure 4, Tav.59)]
Morfeae & albaras [vitiligo or other skin diseases with achromic cutaneous blemishes (*Pityriasis alba, Pityriasis versicolor, Candida albicans etc.*) (Figure 5, Tav.61)]
apostematibus iunctarum [chronic tophaceous gout, characterized by nodular masses of uric acid crystals (tophi) most commonly found in hands and feet]
duritiis [callosity], *verrucis pendentibus* [outgrowths]

volcanic origin. The traditional use continued through the Middle Ages, being reflected in the medical practices of Avicenna and Averroes. The first Pharmacopoeias appeared during the Renaissance with a continuing record of applications until the present.[12]

The muds or sludges with curative and/or aesthetic purposes are preparations that have a solid part, (which is essentially of mineral origin and consists of clay with particular chemical composition and grain size), and a liquid part, generally consisting of mineral, thermal or marine waters.

Table IV. *De balneis Sancti Bartolomei, Rub V* [Illness cured in San Bartolomeo baths].

debiles in iunctiris .. durities aut nodositas ... ac iunctarum ... duritie genu ... membra indurata, contracta [joint stiffness] ...
doloribus podagricis [gout] ...
Vulnera wounds & *ulcera* [plagues and ulcers]
Scabiosis conferunt [scabies (Figure 6, Tav.56)] & *ulceribus* [plagues and ulcers]

Table V. *De balneis Sancte Elenae. Rub VI* [Illness cured in Sant'Elena baths].

aegritudinis capitis [headache] ...
stomacho humido [ulcerative gastritis, secretory gastritis] ...
hydropisi [hydropsy] ...
Confert iuncturis, & eas confortat, & prohibendo fluxum humiditatum ad eas ... Paralysi ... Nervis humiditate repleris ... Spasmo .. caeterisque .. ex causa frigida & humida [pain and loss of joint function]
Decoratio. [beauty spa treatments]
serpigini [*Herpes Zoster* with a dermatomal distribution (Figure 1, Tav. 6)], *albaras* [vitiligo or other skin diseases with achromic cutaneous blemishes (*Pityriasis alba, Pityriasis versicolor, Candida albicans etc.*) (Figure 5, Tav. 61)], *scabiei* [scabies (Figure 6, Tav. 56)] & *maculas corporis superficiales* [skin discoloration]

Table VI. *De balneis Orthonis montis. Rub VII* [Illness cured in Monte Ortone baths].

hydropisi [hydropsy]
dolores antiquos [general pains]

In addition to the traditional applications described above, several papers have been published in order to provide a scientific basis for traditional uses of mud/sludge. Nevertheless, the mechanisms involved are multiple and complex, so it is still difficult today to provide a clear and comprehensive explanation for the beneficial effects observed.

The main properties related to clay minerals are:

1. *Adsorption capacity,* due to the particular distribution of the size of the clay particles. These are in fact very small and once mixed with the thermal water can lead to the formation of colloidal systems or systems with micellar structure which favour the exchanges on the human skin surface.

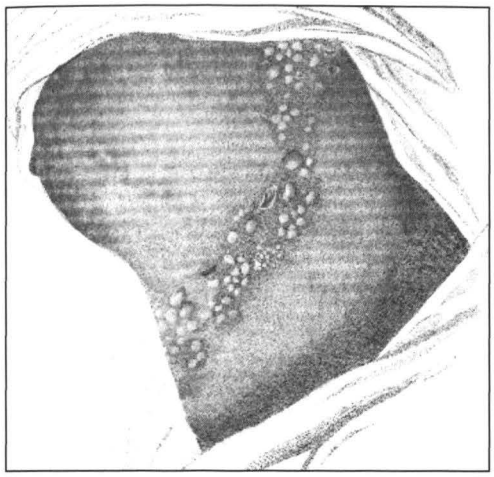

Figure 1. Serpigine acuta. Alibert, Tav. 6.[10]

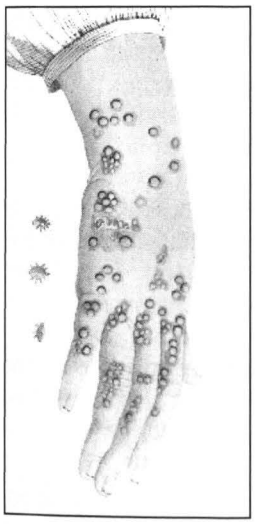

Figure 2. Rogna legitima o Vesciolosa. Alibert, Tav. 55.[10]

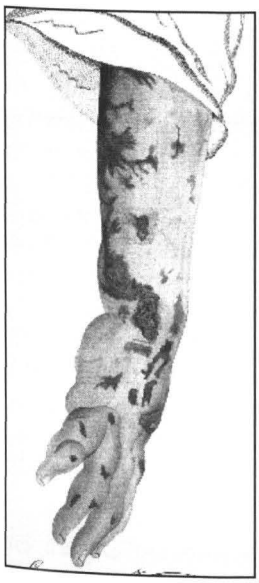

Figure 3. Ematese Varicosa. A libert, Tav. 58.[10]

2. *High ion-exchange capacity,* determined by the spatial arrangement of polar compounds present in the spaces between the crystals of clay, which favours a continuous ion exchange between the thermal water, rich in ions, the clay and the skin. The distribution of the charges that it generates also facilitates the establishment of interactions, physical-chemical (van der Waals forces) and electrostatic, which favour the passage of substances, such as lipids and toxins from the skin to the clay.

3. *Plastic and rheological properties.* The sludge used in the mud, in fact, possess specific characteristics of viscosity and malleability, which affect the ability to retain water and to form a continuous film when applied to the skin surface. These properties are derived from the distribution and reduced size of the clay particles.

4. *Thermal properties*. The mud/sludge for therapeutic and/or dermocosmetic use is characterised by a special ability to retain heat, preventing rapid cooling. This means that once applied very hot on the skin, they cool slowly, keeping the accumulated heat for a long time and without causing damage and burns.

The mud/sludge is applied directly to the skin in a thick layer of a few centimetres that, due to the particular distribution of the clay particles and their physicochemical properties, forms a continuous film capable of performing important beneficial actions.

The action of heat plays a major role in the mechanisms that characterise the beneficial activity of the sludge. Indeed, the application of hot sludge on the skin in the form of cataplasms (poultices), on zones of limited extension, or on large areas of the body, can be used for the treatment of dermatological disorders (i.e. acne, seborrhoea, dermatitis, ulcers) or to reduce the pain and inflammation in the case of chronic rheumatic disorders and arthritis.

When hot mud is applied, due to the heat and the action exerted by the occlusive layer of clay, there is initially an intense increase in the microcirculation with intense hyperaemia and increased sweating.[13] This leads to a significant increase in hydration of the stratum corneum and a modification of the lipid layers of the skin that promotes the exchange of substances. The rapid loss of water and electrolytes due to sweating determines a withdrawal of liquid from the interstitial spaces, which favours the removal of inflammatory mediators, the elimination of catabolites

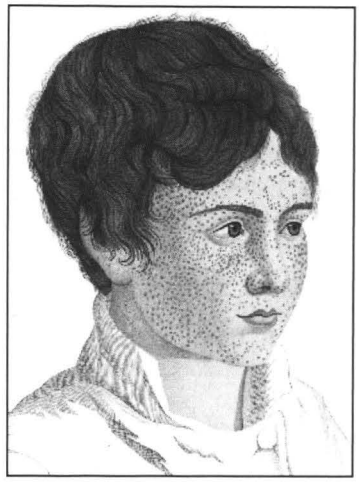

Figure 4. Panno Lenticolare. Alibert, Tav. 59.[10]

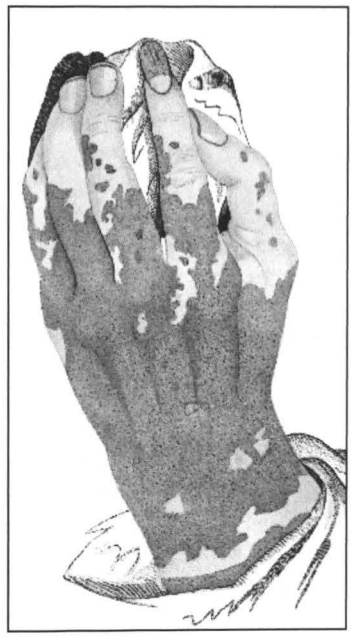

Figure 5. Panno melonato. Alibert, Tav. 61.[10]

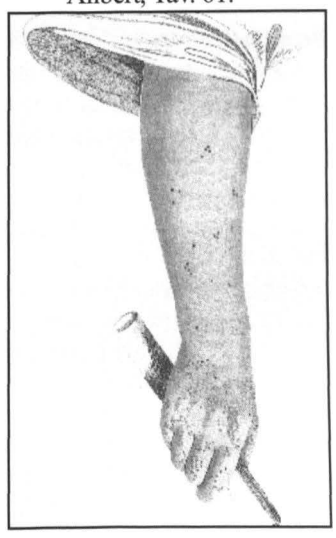

Figure 6. Rogna Serosa o Canina. Alibert, Tav. 56.[10]

and reduces the stagnant fluid in the periarticular tissues, with consequent reduction of pain. In addition, the heat exerts a muscle relaxant action. When the treated surface is large enough, systemic effects also are observed, with increased heart rate and respiration, release of anti-inflammatory hormones (i.e. cortisol) and endogenous opioids (i.e. endorphins) with analgesic properties.[14,15]

Furthermore, the application of hot mud exerts an anti-inflammatory effect, with reduction of swelling and decrease of plasma levels of pro-inflammatory mediators TNF and IL-1β, which play a key role in inflammatory processes associated with rheumatic diseases.[16] It is hypothesised that the lowering of the concentration of inflammatory cytokines is due to a neuroendocrine reaction triggered by thermal stimulus.

The effectiveness of the mud is not only due to the action of heat, but also the transfer of ions and minerals present in the thermal water through the skin. As has been seen, in fact, the essentially mechanical and thermal action exerted by the clay favours not only the elimination of molecules and ions that are adsorbed from the mud, but also the passage of several micronutrients contained in the thermal preparation, necessary for some physiological and metabolic processes. This has been demonstrated in several experiments by in vitro percutaneous absorption, in which it is seen that the clay promotes the transfer through the skin of chemical elements present in the thermal water in proportion to their concentration in the water itself.[17]

The thermal water used in the preparation of the mud has also an active role; it potentiates the action of heat and it reduces pain and inflammation in the joints. This has been demonstrated by a study in which hot thermal mudpacks have been applied to two groups of patients with osteoarthritis of the knee. In the experiment the mud was applied to one group directly on the skin, while in the second group a nylon film was applied between the skin and the mud so as to prevent the exchange of substances between the two. In both groups there was a significant reduction in pain and improved joint function, but with better results in the group receiving direct application on the skin.[18]

Furthermore, in a 1998 study, 55 patients suffering from psoriasis vulgaris were treated only with thermal products: waters, mud, and/or algae, except for bland emollients for xerosis. Treatment for brief periods (10 ± 3 days) resulted in notable improvement.[19]

In another study, 74 patients with *Clostridium difficile* infection, were subjected to routine bathing practices which had, although limited, an efficacy in decreasing the burden of spores on skin.[20] The use of mud for skin application is highly reputed also for wound healing, i.e. for those injured by war. As indicated above, for example the mud (fango) from Battaglia, in the province of Padua, may induce positive effects by stimulation of metabolism, induced perspiration, and promotion of the absorption of pathological effusions; also pain is allayed and alleviated indirectly.[21]

New aspects of health application: From tradition to innovation

Taking advantage of what has been described in the past on the Euganean thermal basin, we have started a research project aimed at the development of a 'fango' featuring some of the qualitative aspects of mud from the Euganean basin, but one that could be adapted for a use at home to extend the beneficial effects obtained after a period of treatment at spas or as complementary treatments for pharmacological therapy of the problems described above. Our approach employs a 'reconstructed' fango. For this purpose, standardised selected natural clays were used, mainly composed of alumino-silicates whose chemical-physical characteristics are equivalent to those from the Euganean basin. They allow the preparation of a fango with plastic characteristics, rheological and thermal specifications, standardised and easily controllable. This also allows us to answer to regulatory aspects necessary for a home use. In this specific case the clay is treated to render it suitable to the purpose of the application. In particular, it was mixed with hyperthermal-bromine-iodine water from the Euganean basin, stabilised and packed ready for application. Studies are still ongoing and we will report in due course a comparison with the effects of mud baths.

Three different applications can be envisaged for such a reconstructed fango.

1. The application of hot reconstructed fango for the treatment of chronic rheumatic disorders, osteoarthritis, spondylitis, fibromyalgia, and bone fractures, while it is to be avoided in acute and subacute rheumatic diseases, heart disease, kidney and liver failure, tuberculosis, epilepsy and pregnancy.
2. In acute diseases, for inflamed or congested areas, the application of cold fango is suggested, because the thermal properties of the clay-water mixture allow the removal of heat from the area affected, by exerting an anti-inflammatory and pain reduction function.
3. Use in the dermo-cosmetic field, especially in the form of facemasks or body applications. The clay exerts a cleansing action the skin that allows the elimination of excess sebum and toxins, while the thermal water provides important tissue trace elements. The combined effects of thermal clay and water should be of benefit in the complementary treatment of acne,[22] psoriasis[23] and dermatitis.[24]

The amelioration of the microcirculation induced by mud application is also applied in health spas to improve the cosmetic appearance of cellulitis, and this approach should be better fulfilled by home application of 'reconstructed fango'. The results related to the above mentioned 'reconstructed fango' are currently under evaluation and will be presented in another paper.

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Endnotes and References

1. Guidi E, Angelini L, Mares D, Contini C, Vicentini CB. The Treatment of Syphilis in Ferrara (Italy) in the 19th Century: The Example of the Ferrarese Pharmacopoeia. *Pharmaceutical Historian* 2010; 40 (1): 2-9; Vicentini CB, Mares D, Guidi E, Angelini L, Contini C, Manfredini S. The Treatment of Tuberculosis in Ferrara (Italy) in the 19th Century. *Pharmaceutical Historian* 2010; 40 (4): 62-68; Vicentini CB, Altieri L, Manfredini S. The Treatment of Cholera in Ferrara (Italy): the European epidemic scenery in the first half of the 19th century. *Pharmaceutical Historian* 2011; 41 (3): 34-41; Vicentini CB, Altieri L, Guidi E, Contini C, Manfredini S. The Treatment of Scrofula in Ferrara (Italy) in the 19th Century. *Pharmaceutical Historian* 2012; 42 (2): 26-32; Vicentini CB, Altieri L., Manfredini S. The Treatment of Scabies in the 19th Century. *Pharmaceutical Historian* 2013; 43 (1): 9-12; Vicentini CB, Altieri L, Manfredini S. In Search of Cinchona Substitutes in Nineteenth-Century Italy. *Pharmacy in History* 2012; 54: 44-47; Guidi E, Angelini L, Lupi S, Vicentini CB, Mares D, Manfredini S, Contini C. Epidemiological, social and public health aspects of tuberculosis in Ferrara in the 19th century. *Le Infezioni in Medicina* 2011; 19 (4): 266-277; Guidi E, Lupi S, Vicentini CB, Manfredini S, Altieri L, Scivales S, Contini C. The role of marine hospices as therapeutic support for scrofula treatment in nineteenth-century Ferrara. *Le Infezioni in Medicina* 2012; 20 (4): 300-312; Vicentini CB, Manfredini S, Altieri L, Lupi S, Guidi E, Contini C. Treatment and remedies against smallpox outbreaks in Ferrara in the late nineteenth century. *Le Infezioni in Medicina* 2013; 21 (3): 238-251.

2. Wade A. Bath spa waters. *Pharmaceutical Historian* 2009; 39 (1): 7-11.

3. Storia pragmatico critica delle Scienze naturali e Mediche (Pragmatic critical history of the natural and medical Sciences). Napoli: dalla tipografia di G. Palma, 1854.

4. Savonarola JM. *De balneis et thermis naturalibus omnibus Italiae*. Ferrara: Andreas Belfortis, Gallus, 1485.

5. Mandruzzato S. Dei bagni di Abano. Padova: per Giovanbattista, e figli Penada, 1789.

6. Savonarola JM. *Practica Savonarole de Febribus Canonica Michaelis Sauonarole. De febribus De egestionibus De pulsibus De omnibus De urinis Italie balneis Tractatus sublimis de vermibus*. Venetiis: Apud Giunta, 1531.

7. Savonarola JM. *Practica maior*. Venetiis: Apud Vincentium Valgrisium, 1560.

8. Dalla Croce GA. *Cirugia universale*. In Venetia: Appresso Nicolò Mezzana, 1661.

9. Tweedie A. *A System of Practical Medicine*. London: Whittaker and Co., Ave-Maria Lane, 1840.

10. Alibert GL. *Clinica del Parigino Ospedale di S. Luigi ossia Trattato completo delle Malattie della pelle*. Venezia: co' Tipi dell'Editore Giuseppe Antonelli, 1835.

11. Schlessinger J. Spa dermatology: past, present, and future. *Dermatol Clin.* 2008; 26 (3): 403-11.

12. Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science* 2002; 21 (3-4): 155–163.

13. Poensin D, Carpentier PH, Féchoz C, Gasparini S. Effects of mud pack treatment on skin microcirculation. *Joint Bone Spine* 2003; 70 (5): 367-70.

14. Cozzi F, Lazzarin P, Todesco S, Cima L. Hypothalamic-pituitary-adrenal axis dysregulation in healthy subjects undergoing mud-bath applications. *Arthritis Rheum* 1995; 38 (5): 724-6.

15. Fioravanti A, Cantarini L, Guidelli GM, Galeazzi M. Mechanisms of action of spa therapies in rheumatic diseases: what scientific evidence is there? *Rheumatol Int* 2011; 31 (1): 1-8.

16. Cozzi F, Carrara M, Sfriso P, Todesco S, Cima L. Anti-inflammatory effect of mud-bath applications on adjuvant arthritis in rats. *Clin Exp Rheumatol* 2004; 22 (6): 763-6.

17. Tateo F, Ravaglioli A, Andreoli C, Bonina F, Coiro V, Degetto S et al. The *in-vitro* percutaneous migration of chemical elements from a thermal mud for healing use. *Applied Clay Science* 2009; 44: 83-94.

18. Odabasi E, Turan M, Erdem H, Tekbas F. Does mud pack treatment have any chemical effect? A randomized controlled clinical study. *J Altern Complement Med* 2008; 14 (5): 559-65.

19. Ubogui J, Stengel FM, Kien MC, Sevinsky L, Rodríguez Lupo L. Thermalism in Argentina Alternative or Complementary Dermatologic Therapy. *Arch Dermatol.* 1998;134(11):1411-1412.

20. Jury LA, Guerriero DM, Burant CJ, Cadnum JL, Donskey CJ. Effectiveness of routine patient bathing to decrease the burden of spores on the skin of patients with Clostridium difficile infection. *Infect Control Hosp Epidemiol.* 2011; 32 (2): 181-4.

21. Luke TD. Therapeutic use of mud. 1912. *Practitioner* 2012; 256 (1751): 28.

22. Argenziano G, Delfino M, Russo N. Mud and bath-therapy in the acne cure. *Clin Ter* 2004; 155 (4): 121-5.

23. Costantino M, Lampa E. Psoriasis and mud bath therapy: clinical-experimental study. *Clin Ter* 2005; 156 (4): 145-9.

24. Carabelli A, De Bernardi di Valserra G, De Bernardi di Valserra M, Tripodi S, Bellotti E, Pozzi R et al. Effect of thermal mud baths on normal, dry and seborrheic skin. *Clin Ter* 1998; 149 (4): 271-5.

Book Review

Prescribed: Writing, Filling, Using and Abusing the Prescription in Modern America

Jeremy A Greene and Elizabeth Siegel Watkins (eds)
Baltimore: The Johns Hopkins University Press, 2012.
Pp. x+329. £15.50. ISBN 978 1 4214 0507 0.

The prescription lies at the very heart of modern pharmacy practice, symbolising in a tangible way much of the role of the pharmacist. It performs diverse and sometimes conflicting functions; on the one hand it serves as the means by which physicians convey their instructions regarding a patient's treatment to pharmacists; on the other it acts as a barrier between patients and their unrestricted access to medicines. But it also performs other functions: it is a demonstration of the clinical autonomy of doctors; a symbol of the subservience of other health professionals; and a political instrument by which governments control the availability of certain products of the pharmaceutical industry. And its ownership has been a matter of debate and negotiation over many years.

Over the centuries the role of the prescription changed little, but new challenges emerged with the start of the therapeutic revolution in the late 1940s. This book focuses on the evolution of the prescription over the last 60 years. All the authors are American and as indicated in the title the book has an exclusively American focus. It consists of an introduction followed by ten chapters written by medical historians. The different chapters focus on different aspects of the contested nature of the prescription and the different functions it has performed in the second half of the twentieth century. The chapters illustrate in considerable detail the problems of overuse, misuse and abuse of medicines, and the ways in which the prescription has been used to control them.

The introduction sets the scene for the book; the editors explain that they 'use the prescription as a shorthand reference for a set of complex relations among the producers, providers, and consumers of medicine'. It also reviews the early history of the prescription up to the middle of the twentieth century before exploring the nature of the prescription in modern American.

In Chapter 1 Nicholas Rasmussen explores concerns about the overuse of barbiturates and attempts by the state to regulate it. He treats the public debate around their use from the mid-1940s to the late 1950s in terms of a 'moral panic'. He shows how the debate blurred the boundaries between addictive narcotics and mothers little helpers available on a doctor's prescription. In Chapter 2 Scott Podolsky considers problems resulting from the overuse of antibiotics, from the 1950s onwards. He shows how the focus shifted to the rational use of drugs following the widespread prophylactic use of antibiotics and the promotion of fixed-dose antibiotic combinations. He explores the process by which better control was eventually achieved following acrimonious discussions between doctors, regulators and the pharmaceutical industry.

Dominique Tobbell considers the issue of brand substitution by pharmacists in Chapter 3. A problem arose in the early 1950s as a result of pharmacists needing to stock the very large number of different brands of the same drug being marketed; it was impossible for retail pharmacists to stock them all. Yet substitution was seen as an attack on the doctor's autonomy, and the combined efforts of the doctors and the industry led to most states passing anti-substitution laws.

In Chapter 4 Elizabeth Siegel Watkins considers patient package inserts and their impact on the relationship between patient, doctor and pharmacist. The first patient package insert was for oral contraceptives in 1970. Before that date, doctors controlled the amount and type of information that was revealed to patients about prescription drugs. The women's health and consumer movements of the 1970s lead to demands for patients to be given access to all available information. American pharmacists opposed the use of inserts, and were anxious to uphold the role of the prescription as a boundary marker between experts and lay people.

Chapter 5 explores the issue of who has the right to write prescriptions. Julie Fairman notes how physicians in the United States felt besieged as nurse practitioners, pharmacists and physician assistants all tried to gain prescription writing privileges at the same time in the 1970s and early 1980s. She presents a detailed case study of the struggles nurses had in state after state with doctors, pharmacists and regulators to win the right to write prescriptions.

The theme of who has the right to prescribe is continued in Chapter 6, in which Judith Houck takes a feminist approach to well-women clinics. A clinic was founded in California in the 1970s with the aim of providing well-woman health care free from medical oversight. In this situation the prescription had an ambiguous role. On the one hand it limited the extent to which lay persons could provide health care; on the other sympathetic physicians wrote pre-signed prescriptions or signed off a week's worth of prescriptions at a time.

In Chapter 7 the focus shifts from who prescribes to whether particular drugs should be restricted to prescription only at all. Heather Munro Prescott considers the campaign to make oral contraceptives and emergency contraceptive pills available over the counter. The possible dangers of oral contraceptives came to light in the second half of 1962, when the number of cases of blood clots reported rose from 28 to 272. Prescott explores how, following changes to formulation and guidance for use, the Food and Drugs Administration was eventually persuaded that it was safe to make them available over the counter. In doing so she shows how feminist grassroots activism helped to redefine the meaning of the prescription.

The theme of different categories of drug regulation is continued in Chapter 8, this time in relation to the

prescribing of narcotics. Prescriptions for opioids in particular carry a social and cultural meaning as well as a legal one. Marcia Meldrum shows how they make both doctor and patient visible and hence expose both to the risk of stigma and marginalisation in society. She illustrates the difficulties doctors often had in negotiating the fine line between meeting patients' genuine need for opioid pain relievers and feeding their addiction.

In Chapter 9 David Herzberg explores the role of 'scrip mills' in which Quaalude (methaqualone) became a notorious drug of abuse in the 1970s. The drug was highly addictive and special clinics were set up where addicts could obtain supplies. The chapter illustrates how an apparently simple question; 'what is the difference between prescribing and drug trafficking?' does not necessarily have a simple answer. Herzberg shows that prescribing can be a commercial transaction whether it occurs in a scrip mill or in a legitimate doctor's office.

In the final chapter Jeremy Greene considers the afterlife of the prescription. Whilst the lifespan of the prescription is probably only hours or even minutes, Greene shows how over the last fifty years the vast quantities of prescriptions written and dispensed have been used to create huge systems of therapeutic surveillance, with important implications for both drug safety and marketing. Computerisation has allowed the automation of pharmacovigilance. In this chapter Greene illustrates the evolution of drug prescribing databases, and how the prescription has become a tool for market research; prescription databases are now big business in their own right.

This highly readable book will be of considerable interest to historians of pharmacy. They will make a number of general observations arising from its publication: that a substantial number of eminent medical historians are now engaged in research on the development and use of pharmaceuticals; that much of this research examines contemporary practice, and certainly that within the last fifty years; and that much of this effort is focused on practice in the United States.

The transformation of the prescription has been very different in different countries, as a result of differences in welfare, funding arrangements for medicines, and legislation. But in them all the prescription serves as a link between clinical practice and medical commerce, between doctor and pharmacist, and between pharmacist and patient. In most countries the recent history of the prescription is yet to be written. Those who take on this challenge would be well advised to take note of the issues raised in this important book and the way in which they are addressed.

Dr Stuart A Anderson

David Waldie (1813-89)

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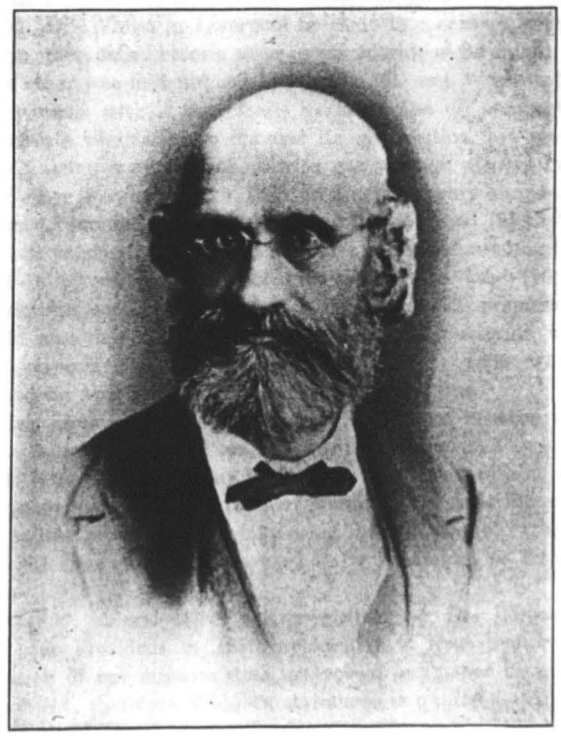
The year 2013 marks the bicentenary of the birth of David Waldie who gained prominence for the discovery of the anaesthetic properties of chloroform. He had an Indian connection where he was instrumental in starting chemical manufacturing for the first time; he died after spending 36 of his life span of 76 years there.

In August 1988 while examining the files of the *Indian and Eastern Druggist* at the Royal Pharmaceutical Society of Great Britain Library I came across an article on David Waldie[1] which aroused my interest for studies on him. I also kept an eye open for literature pertaining to Waldie during my search of archival material in general on the medico-pharmaceutical history of India. I located certain new references of interest and also obtained useful source material on him through correspondence with several institutions over many years. The West Lothian History Library, Linlithgow, Scotland supplied relevant material from the local newspapers.[2] To get started on the writing the well known sources on the subject were studied.[3-6]



David Waldie, the eldest son of Alexander Waldie and his wife Agnes Ford, was born in the Royal Burgh of Linlithgow, Scotland, on 27 February 1813.[7] He had his early elementary education in his native town before proceeding to Edinburgh for his medical studies at the Royal College of Surgeons at the very early age of 14 years; five years later he qualified as a surgeon obtaining the Diploma of the College in November 1831. Thereafter he practised as a surgeon, apothecary and druggist at Linlithgow.

Waldie had an abiding interest in chemistry and became Fellow of the Chemical Society, London, in 1843.[8] Possibly it was his interest in chemistry which made him to give up practice as a surgeon and apothecary at Linlithgow in 1839 or 1840 and become a chemist to Liverpool Apothecaries Hall, later known as Liverpool Apothecaries Company.[4,9,10] After several years at Liverpool he started feeling that it would be a slow process to get remunerative business there, so he accepted the post of a chemist at a firm (Malcolm & Co.) in Calcutta and left for India in 1853.[3]

Based on information from major publications pertaining to Waldie and some fresh material I have been able to collect, the coverage which follows is categorised under the headings: Discovery of Chloroform Use as an Anaesthetic; Chemical Manufacturing and Analysis Work in India; Demise and Burial; and Waldie Memorials.

Discovery of Chloroform Use as an Anaesthetic

Developments leading to chloroform use as an anaesthetic are found in the articles cited here .[3-6]

David Waldie worked on the preparation of chloroform. It was he who suggested to Sir James Young Simpson, gynaecologist, to try chloroform as an anaesthetic. Simpson produced wonderful results but the findings he projected did not give due credit to Waldie who in the first place had brought chloroform use to his notice.

Waldie and Simpson were both born in Linlithgowshire. They studied medicine in Edinburgh during the same years and were friends.[7]

At the Liverpool Apothecaries Hall Waldie prepared chloric ether, a spirituous solution of chloroform, in a crude manner by distilling alcohol with chloride of lime.[8] He introduced an improved method of separating the chloroform and dissolving it in known quantity of spirit. Near the same time in October 1847 he had a meeting with Simpson about which he wrote in his own words:

> On occasion of a visit to Dr Simpson, when in Scotland in 1847, he spoke to me of his trials of various vapours, in his endeavours to discover something else than Ether, at that time employed to some extent for anaesthetic purposes, amongst others mentioning Chloric Ether, the chemical constitution of which he was evidently not aware of. This I explained to him, showing him that it was chiefly vapour of alcohol that would be inhaled, and advised to try the pure Chloroform, which appeared to me likely to be suitable. I promised also to prepare some as soon as I could return to Liverpool, and send him for trial. Unfortunately the laboratory of the Company had previously been destroyed by fire and was not then restored, so that I could not prepare it …[11]

Simpson did not wait for Waldie to send chloroform, but he himself had it prepared and tried it as an anaesthetic in obstetrics. He communicated the results to Edinburgh Medico-Chirurgical Society in November 1847.

Several studies have been carried out which ensure a positive place for Waldie as a discoverer of the anaesthetic use of chloroform. The in-depth investigations by Dilling[3] and Dundee[6] deserve a special mention. Dilling described D. Waldie as 'Prophet of the Anaesthetic Properties of Chloroform.'[3] Based on his study Dundee wrote:

> Waldie clearly stated his part in the discovery and refuted claims to any honours not due to him. He never claimed priority over Simpson, although not satisfied with the amount of credit he got …'[6]

About the Dundee's paper it has been said, 'probably this is the best account of the choloroform controversy'.[10]

Chemical Manufacturing and Analysis Work in India

It is stated that:

> In 1853 Mr Waldie went to Calcutta (now known as Kolkata), being sent out by the firm Malcolm and Co. as experimental chemist. There he not only superintended the refining of borax and saltpetre at Goosery (Ghusury), but also carried out the manufacture of carthamim from safflower; the latter, however, was not pecuniarily successful. On Messrs Malcolm and Co. reliquinshing business Mr Waldie took over a manufacturing business at Duckinsore (Dakhineswar), and also practised as an analytical chemist. This business he afterwards removed to Barnagore (Baranagore), and eventually to Cossipore, carrying it on up to 1887, when he sold it to its present proprietors.[8]

It appears that the parent firm Messrs Malcolm and Co. in Britain deputed him to work at their unit in India and they possibly were already in the business of chemical manufacturing. For want of any other information on the company and otherwise, and later Waldie himself establishing himself as a successful chemical manufacturer, credit is given to him as being the first to start chemical manufacturing in India.

According to Dilling,

> In 1853 he accepted the post of chemist to a firm (Malcolm & Co.) in Calcutta, and reached there on 13th May, 1853 … the firm, Malcolm & Co., which seems to have been in difficulties, and in November, 1857, Waldie considers taking over a small chemical factory, started by a Dr Porteous, probably at Barnagore (Baranagore), and relinquishing his connection with Malcolm & Co. … he found the Barnagore factory too small and had transferred to new premises at Kasipur (Kashipur), where he founded the Cossipore Chemical Works. …[3]

A limited number of items were manufactured at the Cossipore Chemical Works. I have come across a vague statement that around 1884 at the Economical Section of the Indian Court where there was a complete classified collection of indigenous drugs, D. Waldie exhibited 'some of the chemical products, acids, ethers, etc. manufactured in his laboratory at Cossipore.'[12]

The association of Waldie with Cossipore Chemical Works continued till 1887[8] or may be later till his passing away as it is mentioned at an other place.[3] Subsequently it was named D. Waldie & Company. At a certain stage Waldie had taken into partnership a young geologist, WR Criper, who expanded the business and shifted the company to Konnagar.[13]

In a 1896 article it was stated 'There is only one chemical works – Messrs. Waldie & Co., near Calcutta and their principal production is in the mineral acids.'[14]

According to a survey of industrial development of Bengal for the period 1900-1939 the three chemical industries named were Bengal Chemical and Pharmaceutical Works, Bengal Immunity Company and D. Waldie and Company, the latter being the pioneer in the chemical industry in Bengal.[15]

As well as a successful chemical manufacturer Waldie was also an accomplished analyst. He was a chemical expert to all merchants in Calcutta, analysing samples of shellac and other articles of the East India produce.[3] His certificate was accepted throughout Calcutta. It was stated that:

> Between 1866 and 1867 he made extensive investigations into the character of the water of Hoogly River. He was able to prove that the water of this river was the purest that could be obtained. This result of his investigations was challenged at the time, but was later proved to be correct. Waldie was actively concerned with the purification of the Calcutta water-supply and in this connection did valuable work of great and lasting benefit to the community.[1]

On this theme I came across a reference to a publication by Waldie (1874),[16] while working at the National Library, Calcutta.

Demise and Burial

After coming to India in 1853 David Waldie lived in the country until he passed away on 23 June 1889.[3,6]

Waldie continued to be busy with his vocation of chemical manufacturing and analysis, but he spared time to actively associate with the Asiatic Society of Bengal which had started as the Asiatic Society and was the oldest institution in India of learning in science and humanities.[17] The following extract from the proceedings of the July 1889 meeting of the Asiatic Society of Bengal recorded his demise and also put on record the particulars of Waldie's association with the Society:

> The President said – I very much regret to have to announce the death since our last meeting of Dr D. Waldie, one of our oldest members of the Council. Dr Waldie joined the society in 1865 and had served on the Council since 1879, having been vice-president in the years 1884-1885. He was a most regular attendant at our meetings, and was always ready to further the work of the society in auditing accounts and giving his services on various committees. He published several papers in the journal and Proceedings, most of which were connected with the water supply of Calcutta, and the effective filtration of the Hoogly water during the rainy season, which has always been a difficulty. Before Dr Waldie came to India some forty years ago, he had been connected with Sir James Simpson, who was the first to apply sulphuric ether as an anaesthetic, and appears to have suggested to him the use of chloroform instead of ether, though our late friend and associate does not seem to have received full credit for his share in one of the most important discoveries of the age. A man of retiring and unassuming ways, we have had few opportunities of knowing the full extent of his scientific work, but as an analytical chemist and chemical manufacturer he undoubtedly did much to promote chemical science in this country. I believe he also did good service in connection with the establishment of libraries and institutes in the neighbourhood of his works at Cossipore and Dakhinsur (Dakhineswar). We shall miss his kindly presence here, and he will be regretted by many who know his worth.[18]

In a reference to the burial of Waldie at Calcutta it was stated:[1]

> a tombstone may be seen in the Scottish Burial Ground there bearing the following inscription:
>
> Sacred to the Memory of DAVID WALDIE, eldest son of Alexander Waldie, and his Wife, Agnes Ford, Linlithgow, Scotland. Born 27th February, 1813. Died 23rd June 1889. Aged 76 years.
>
> Chloroform – One of God's Best Gifts to His Suffering Children.

I requested a senior colleague of mine in the profession who lived close to the Scottish Burial Ground at Calcutta to check on the inscription on Waldie's tombstone; I was disappointed at his stating in the reply, 'It is near our flat but cemetery is a jungle now and it is abandoned. It was difficult to trace anything there ...'[19]

As I was studying David Waldie, there arose a confusion about the place of his burial. I noted that in the oft-cited papers on Waldie by Dilling[3] and Dundee[6] the burial was put at the Howrah Cemetery at Calcutta.

The doubt about the place of burial of Waldie now seems to be clearing in favour of his resting place being the Scottish Cemetery at Calcutta. The grave of Waldie has been located at the Cemetery, which like many is in a bad state of repair, and a scheme is afoot to restore it, along with 2000 others in the graveyard.[20] It may be noted that there is a scheme backed by the Royal Commission for Ancient and Historic Monuments and by the Kolkata Scottish Heritage Trust, headed by James Simpson, a leading conservation architect based in Edinburgh.

The Annet House Museum, Linlithgow, in May 2013 organised a redisplay of the museum's Waldie exhibition, a key feature of which was a display telling of Waldie's journey to India in 1853, based on the diary kept by Waldie during his journey.[21]

Waldie Memorials

The year 1913 marked the centennial of birth of David Waldie. In early 1913 a movement started for commemorating the occasion by Alexander Spence, MPS, of Leslie, Fifeshire, who was a native and ex-Magistrate of the Burgh of Linlithgow.[1,6,7,18] In a source it is mentioned that Alexander Spence and 'J. D. Nimmo, Chairman of the National Bank of India' started the movement together.[3] In 1915, a bronze portrait medallion tablet with appropriate inscription was erected on the wall at 67 High Street where Dr Waldie had resided.[7,18]

It seems that the first Waldie memorial was put up not in Scotland but in India. On 9 November 1913, prior to the monthly general meeting of the Asiatic Society of Bengal, a brass tablet in memory of David Waldie was unveiled, placed on the wall at the top of the main staircase bearing the following inscription,[3] which has also been reproduced elsewhere:[1,6]

In memory of

DAVID WALDIE

Born in Linlithgow, Scotland, Feb. 27th,1813 David Waldie was associated with the discovery, in 1847, of anaesthetic properties of chloroform. Arriving in Calcutta 1853, he

became the pioneer of chemical manufacture in India. He was an active member of this Society for twentyfive years and served on the Council for ten years. Died in Calcutta, June 23rd 1889.

Erected by Messrs D. Waldie & Co., in 1913

Out of the references cited the memorial tablet illustration appeared only in Faraday's article;[1] this was a photograph by *The Statesman*, Calcutta, lent to him by Alexander Spence.

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References and Endnotes

1. Faraday, WB. The Pioneer of Chemical Manufacture in India – Dr David Waldie – Discoverer of Anaesthetic Properties of Chloroform. *Indian and Eastern Druggist* 1921; 2: 109-111. For writing the article, supporting material was made available to Faraday by Alexander Spence; the article carries no list of references.
2. Cavanagh, M Sybil, Local History Librarian, West Lothian History Library, Linlithgow, West Lothian. Correspondence carried out in September 1996 and May 2013.
3. Dilling, W J. David Waldie. *Liverpool Medico-Chrurgical Journal* 1934; 42: 82-98. Walter Dilling was Professor of Pharmacology at the University of Liverpool.
4. Bickerton, TH. *A Medical History of Liverpool from the Earliest Days to the Year 1920.* London: J Murray, 1936: 135-137.
5. Duncum, BN. *The Development of Inhalation Anaesthesia with Special Reference to the Years 1846-1900.* London: Oxford University Press for the Wellcome Historical Medical Museum, 1947: 172-175.
6. Dundee, JW. David Waldie: Facts and Fiction. *Anaesthesia* 1953; 8: 218-229. John Dundee was a Lecturer in Anaesthesia at the University of Liverpool at the time.
7. *West Lothian Courier* 18 June, 1915: 6.
8. *Journal of the Chemical Society* 1890; 47: 456-457.
9. Whittet, TD. *Chemist and Druggist* 1962; 178 (8 Sep): 278-280.
10. Whittet, TD. *Chemist and Druggist* 1963; 179 (2 Mar): 239.
11. Waldie, D. Restatement published in Waldie, G. *The True Story of the Introduction of Chloroform into Anaesthetics.* Linlithgow: George Waldie, 1870. From Dundee, JW, (Reference 6).
12. *Indian Medical Gazettee* 1884; 19: 23.
13. *Waldie Limited.* A small pamphlet pertaining to the firm supplied to me in 1996 by R. Mallick of the Company. The establishment has gone through further changes and is now engaged in manufacture of lead oxides for the PVC industry and operates as a subsidiary of Gillanders Arbuthnot and Company.
14. Wm Mair. Pharmacy in India. *American Druggist and Pharmaceutical Record* 1896; 29 (4): 96-100.
15. Iftikhar-ul-Awwal, AZM. *The Industrial Development of Bengal 1900-1939.* New Delhi:Vikas Publishing House, 1982: 153-154.
16. Waldie, D. *Observations on the Filtration of the Hugli Water, for the Water Supply.* Calcutta: The Englishman Press, 1874.
17. The Asiatic Society was founded in 1784. Its name has undergone various changes: Asiatic Society of Bengal (1832-1935); the Royal Asiatic Society of Bengal (1936-1951); and in July 1952 it became known as the Asiatic Society.
18. *Linlithgowshire Gazette* 11 June 1915: 4. The text has also been reproduced in other places.
19. Chakravarty, D. Personal communication (26 May 1992). He lived on 2A Blaka, 68B Ballygunge Circular Road.
20. Jamieson, B. Scruffy grave marks doctor's burial site. *Linlithgow Journal and Gazette* 18 November 2011: 19.
21. David Waldie 1813-1889. *Heritage West Lothian* Spring 2013: 5.

Paracelsus Experiments in a Persian Book on Compound Remedies, *Amal-e-Saleh* (1766 A.D.)

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Traditional treatises of pharmacy in Persian are divided basically in three main categories:[1]

1. **Texts** which specially introduce crude therapeutic materials e.g. *Makhzan Aladvieh*[2].

2. ***Qarabadins*** which present recipes (traditional dosage forms containing various crude materials). *Oxymel*, *Laooq* and *Abkama* are such recopies which have been recently reviewed.[3-5] The chapters of these texts were usually arranged in alphabetical order of either the names of dosage forms (*Amal-e-Saleh*)[6] or based on the disease types (*Qarabadin-e Kabir*)[7] or body organs (*Alaj Alamraz Farsi*).[8]

3. **Comprehensive works** composed of discussions about crude drugs and remedy formulations, usually the first part of the volume being devoted to the former, and the second part to the latter, like *Ekhtiarat-e Badiei.*[9]

Amal-e-Saleh: A Traditional Pharmacopoeia in Persian

Amal-e-Saleh, which contains recipes of compound pharmaceutical remedies (*Qarabadin*), was arranged alphabetically similar to current pharmacopoeias.[10] It was composed of two parts: introduction and instruction

on the preparation of remedy formulations. The introduction describes different weighing systems, old-fashioned scales and measurements alongside their equivalents. General methods of preparing crude materials are discussed in this part, e.g. distilling, curing and rinsing. The other part of the manuscript (*Morakkabat*) deals with preparation methods for compound remedies. Alphabetically arranged monographs in this part are composed of the remedy name, precise pronunciation of the name, synonyms in other languages, the reference of formulation, if any, therapeutic effects on different organs and body temperament, formulation and preparation method, potency and dosage, equivalent formulation and time of keeping the final product. For instance the monograph and its components for Squill Pill is shown in Figure 1.

Beneficial and Practical Hints of Pharmacy

Interesting pharmaceutical hints have been presented in *Amal-e-Saleh*. The followings are some examples.

- Compounding: preparation of dosage forms using simple instruments, processing and using special vessels and tools. Medicinal oil extraction methods, medicinal smoke collection and preparation of aromatic distillations. Zargaran reviewed such methods for pharmaceutical ancient tools.[11]
- Organoleptic descriptions of raw materials which are practically usable for quality control (reference 6, p. 124). Similar organoleptic controls are still valid in current pharmacopoeias.
- Sublingual pills e.g. *Hab albakhar* (reference 6, p. 128).
- Aromatherapy for mental disorders e.g. *Shamom* dosage form (reference 6, p. 288).
- Medicinal belt, a kind of sustained-release dosage form whose annual replacement was advised (reference 6, p. 132).[6]
- Dosage adjustments according to the patient's age (reference 6, p. 240).

Salehi: Author of *Amal-e-Saleh*

Saleh Ibn Mohammad Ibn Mohammad Saleh Qaeni Heravi (Salehi) is little-known in the literature. According to Salehi's autobiography, his origin was the city of Qaen (centre for Qohestan state, now southern Khorasan, Iran), but he was born in Herat (a city of Khorasan, now Afghanistan) and lived in Bakhtar (now Balkh in Afghanistan). He compiled *Amal-e-Saleh* in 1180 AH/1766 AD containing an introduction and 28 sections, each of which includes several chapters. His two other medical works in Persian are *Manzomeh*, a book of medical poetry, and *Tohfat-al-Saleheen*, written about materia medica. These two titles are mentioned in *Amal-e-Saleh*. In addition to Salehi's Persian mother language, the scientific texts had been written in Persian in a part of Asia up to 1275 AH/1858 AD when the *Gorkanian* kingdom ended in India;[12] therefore Salehi compiled his works in Persian.

References and Authorities of *Amal-e-Saleh*

Salehi's work was mainly based on observation and examination of available data on natural remedies. The sources and layout of *Amal-e-Saleh* text are composed of:

- Ancient manuscripts (Persian, Roman, Greek, Egyptian).
- Medieval manuscripts including: *Meftah Al-teb, Sharh-e Asbab, Menhaj, Resale Qalbieh, Al-Havi, Zakhireh Kharazmshahi,* mainly written by the Islamic era scientists: Qalanesi, Aqsaraei, Avecina, Abolfaraj, Rhazes, Jorjani, Ibn Nafis, Khojandi, Mokhtar Ibn Hobal and Hally Abbas.
- Prophetic Hadiths, mainly their philosophy and ethical aspects.
- Manuscripts from European culture. Salehi reported 'black salt' from European (Farangi) physicians, remedies from Brakelsus and 'Mastic oil' from Senaretus Algermani and Vaqerius drug compendium (*Qarabadin-e-Vaqerius*), two European pharmacists (see reference 13).
- Directly learning from mentors like Ibn Helale Ardebili.
- Observation and examination of folk medicine and ethnopharmacological issues during his journeys. Salehi quoted his personal experiences of treatment as anecdotes with details containing the patient's age,

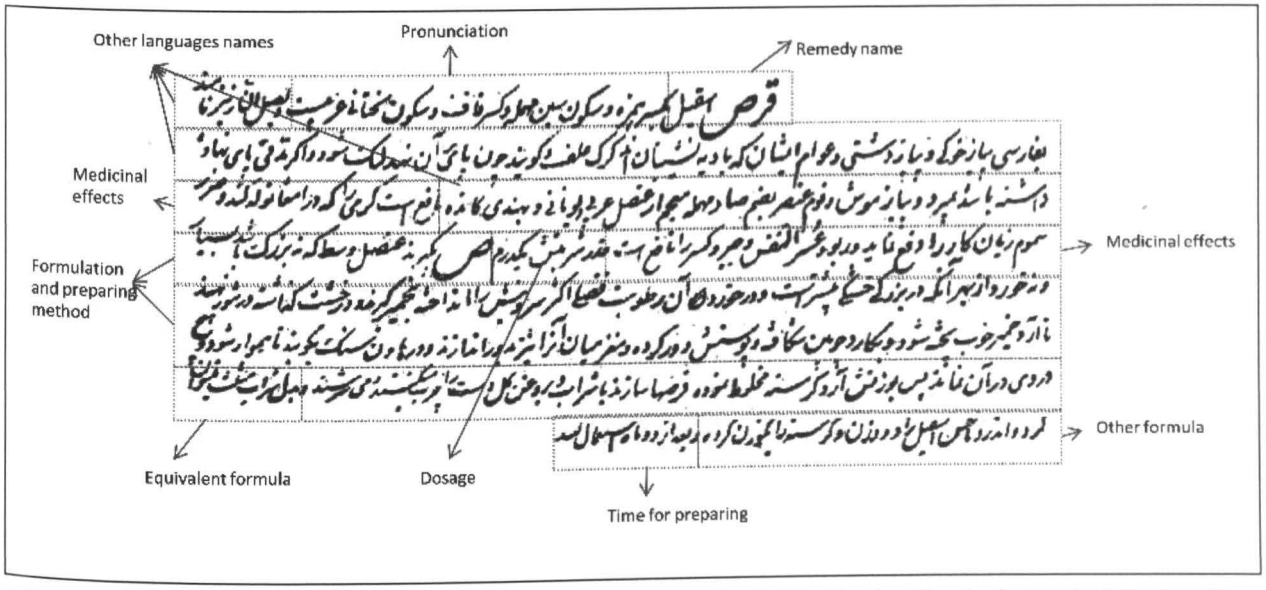

Figure 1. The monograph of Squill pill and its components from *Amal-e-Saleh*, a Persian *Qarabadin* (1180 AH/1766 AD).

gender and illness, treatment needed and its length. An example of this sort of case report is translated as follows (reference 6, p.140):

> A 6 year-old girl in Isfahan had been suffering from an unknown disease for which the treatment by most physicians had been unsuccessful for one year. She became pale-yellowish bearing high fever. Salehi reported he prescribed milk for 5 days and pill (3-5 issues) of Artemisia leaves plus pulverised pomegranate seeds at sleep time for 7 days. The patient easily defaecated 5-6 times a day containing worms. Her parents reported more than 120 worms and she became healthy.

Paracelsus in *Amal-e-Saleh*

Salehi reported prescriptions and remedies from a European (Farangi in Persian) chemist and pharmacist Berakelsus Farangi in *Amal-e-Saleh* e.g. 'Zolkhasiat elixir from Berakelsus Farangi' (see p. 76),[6] 'Oil of gold from Berakelsus Farangi' (see p. 207),[6] 'Simple wheat oil prepared in the way of master of Alchemists Berakelsus Farangi ...' (p. 216)[6] and 'An urolithic salt prepared by Hakim Berakelsus' (see p. 505).[6] 'Diuretic distill water compounded by Brakelsus ...' (see p. 347).[6] The history of science shows that Brakelsus Farangi, Yermani or Germani, mentioned in Persian works, must have been the German-Swiss Renaissance physician, botanist and alchemist, Philippus Aureolus Theophrastus Bombastus von Hohenheim (1493-1541 AD). He was known as Paracelsus.[14] Historians recognise him for the introduction of experiments and observations into medical treatment. Furthermore he founded the discipline of toxicology and is credited with the terms zinc (*zincum*), gas, chemistry and alcohol.[4] As a physician of the early 16th century, Paracelsus fathered a new field called *Iatrochemistry* (Tebb-e Kimiaee in Persian).[15] The first one to explain the signs of syphilis thoroughly was Paracelsus.[15] Similarly Salehi has reported a compound for syphilis (Atashak-e Farangi or Afrangi in Persian) developed by Paracelsus.

Figure 2. The opening (right-hand side) and last (left-hand side) pages of *Amal-e-Saleh* (Experiments of Saleh) lithograph version (1284 AH/ 1867 AD) no. C-10. Medical museum of Shiraz University of Medical Sciences.

One Arabic translation of *The New Chemical Medicine of Paracelsus* is stored in the United States' National Library of Medicine (NLM),[1] entitled *Kitab Al-Tibb Al-jadid Al-kimiyai Talif Barakelsus,* by Salih Ibn Nasr Allah Al-Halabi Ibn Sallum (died: 1081 AH/1670 AD). This work is subdivided into four chapters (maqalat) and an addendum. The four main chapters are based on the works of Daniel Sennert; particularly the latter's *Institutionum Medicinae* published in Latin in 1611 AD. (1020 AH). The addendum consists of an Arabic translation, much shortened, of the *Basilica Chymica* or Royal Chemistry by Oswald Croll, compiled and translated by Ibn Sallum entitled *Alkimiya Al-Malakiyah*. Two other treatises in the Islamic Parliament library of Iran are: an Arabic translation of *Ketab Aljadid Alkimiaei Allazi Akhtara-o Brakelsus* (The New Book of Chemistry invented by Paracelsus), Figure 3; and a Persian translation of *Tebb-e-Kimiaee Berakelsus* (The Chemical Medicine of Paracelsus) by an anonymous translator (1235 AH/1820 AD), Figure 4.

Western–Eastern Bilateral Scientific Interactions

Medical anecdotes in *Amal-e-Saleh* showed that Salehi had traveled throughout the Middle East to search for raw materials and new methods of treatment based on Persian, Afghan, Turkish, Arabic and Syrian heritages taught by passengers, merchants, hakims, immigrants and physicians. Moreover he had become familiar with Indian, European (Farangi in Persian), Touranian, Egyptian or Chinese medical heritages (Figure 3).

Salehi, was born in Herat and lived in Balkh therefore many of his medical observations belong to the Khorasan area, e.g. cure of arthritis in a Balkh ruler's wife.

As mentioned before he cured a girl with intestinal worms during his residence in Isfahan and found Antimony stone, an antisyphilis remedy introduced by Farangian (manuscripts of Paracelsus) in his home city, Qaen (Iran). He quoted a story of the discovery of adulteration of Scammony that happened in Baghdad (Iraq). Furthermore, some of his experiences are from Syria where he was looking for Samake-e-Syda (a kind of fish from Sidon with medicinal effects) (see p. 260).[6]

The connection between Middle Eastern culture and Europe (Farang in Persian mainly means England, France and Portugal) is the result of Venetian connections to the Safavid dynasty.[16] At least two arms of the Silk Road, originating from 'Eastern Room' [Turkey, see fig. 5] and continued through Syria, Iraq, Iran, Afghanistan and China and by sea via India, can be recognised. As is clear from the distribution pattern of cities and places that Salehi had visited (Fig. 5), the direction matches the Islamic part of the land Silk Road , i.e. the road of cultural communication, the road for raw material transfer or the Spice Road. Though Salehi quoted experiences, raw materials or remedies from Byzantium, Khata (Tibet), Cyprus, Morocco, Yeman, Oman, Europe, Touran (Central Asia) and India, he never travelled there.

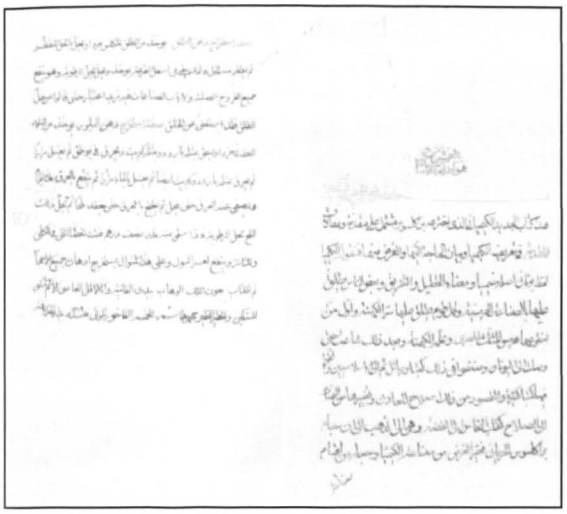

Figure 3. The opening (right-hand side) and last (left-hand side) pages of an Arabic translation of *Ketab Aljadid Alkimiaei Allazi Akhtara-o Brakelsus* (The New Book of Chemistry invented by Paracelsus) by an anonymous translator, the copy was made in 1309 AH/1892 AD by the scribe Taloee, no. 86191. Islamic Parliament library of Iran.

Figure 4. The opening (right-hand side) and last (left-hand side) pages of a Persian translation of *Tebb-e-Kimiaee Berakelsus* (The Chemical Medicine of Paracelsus) by anonymous translator (1235 AH/1820 AD), no. 85901. Islamic Parliament library of Iran.

Conclusion

This is the first report referencing Berakelsus in the old pharmaceutical eastern texts in Persian. Our findings proved a bilateral interaction between eastern and western pharmaceutical knowledge by land via the Silk Road, Cultural Road or Spice Road.

Acknowledgments

This work forms a part of Parmis Badr's PhD research work on traditional Persian medical manuscripts.

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Endnotes and References

1. http://www.nlm.nih.gov/
2. Aghili, SMH. *Makhzan Aladvieh*. Calcite, 1844.
3. Zargaran A, Zarshenas MM, Mehdizadeh A, Mohagheghzadeh A. Oxymel in medieval Persia. *Pharmaceutical Historian (London)* 2012; 42:11-13.
4. Zarshenas MM, Badr P, Moein MR. Laooq: Selective respiratory dosage form used in medieval Persia. *Pharmaceutical Historian (London)* 2013; 43: 34-38.
5. Hosseinkhani A, Zargaran A, Zarshenas MM, Mehdizadeh A. Abkama, the first reported antibiotic in gastritis and infections throughout history. *Pharmaceutical Historian (London)* 2013; 43: 39-41.
6. Saleh Qaeni Heravi S. *Amal-e-Saleh*. Badr P, Mohagheghzadeh A, Shams-Ardakani M (research and rewritten). Tehran, 2013.
7. Aghili SMH. *Qarabadin Kabir*. Calcite, 1844.
8. Dehlavi M. *Alaj Alamraz Farsi*. Menaee MB, Mahmodi D (rewritten). Tehran, 2013.
9. Ansari Shirazi A. *Ekhtiarate Badiei*. Reported by Mir MT. Tehran, 1992.
10. *British Pharmacopoeia*. London, 2013.
11. Zargaran A, Ahrnadi SA, Daneshamouz S, Mohagheghzadeh A. Ancient Persian pharmaceutical vessels and tools in Iranian Archaeological museums. *Pharmacetical Historian (Lond)* 2012; 42: 68-71.
12. Safa Z. *A history of Iranian literature*. Tehran, 2010.
13. Noemani A. Several major Persian medical manuscripts in the library Shebli. *Namehe Parsian* 1998; 4: 256-268.
14. http://fa.wikipedia.org/wiki
15. Greenberg A. *From Alchemy to chemistry in picture and story*. New Jersey, 2007.
16. Amiri M. *Venetian itinerary in Iran*. Tehran, 2002.

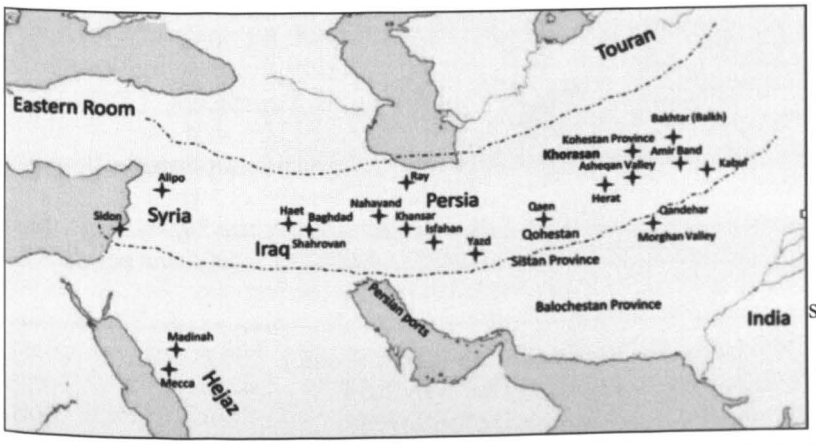

Figure 5. Cities and places (shown by stars) visited by Salehi during his journeys and reported in *Amal-e-Saleh* (before 1180 AH/1766 AD). The Silk Road in the Middle East is indicated by dot-dash.

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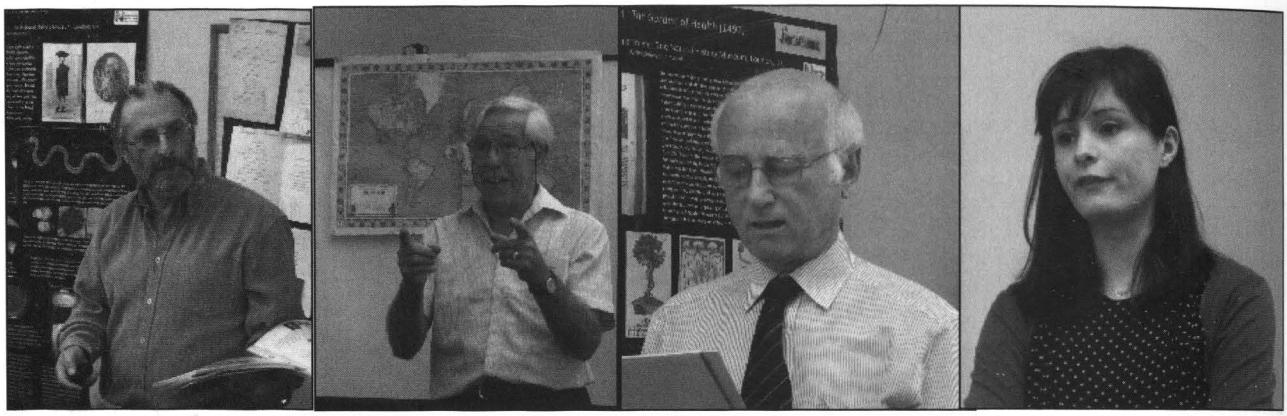

Speakers at the BSHP Conference, *left to right:* Dr Chris Duffin; Forbes Powrie; Dr Stuart Anderson and Elizabeth Nally, the winner of the Burnby Award. Photos: Peter Homan and Christiane Staiger.

The audience at the meeting, *left,* and puzzling over the after-dinner quiz, *right.*
Below, the canal boat trip around the James Brindley Canal in central Birmingham.

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Founded 1967

British Society for the History of Pharmacy

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Diary

Please note that evening meetings in 2014 will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise stated. The RPS will be moving in **2015** to 58 East Smithfield, London E1W 1AW, near St Katharine's Dock, Tower Bridge and Tower Hill Underground Station. Details will be provided in good time.

Monday 6 October 2014
'Galen' by Vivian Nutting. Lambeth, 5.30 pm.

12 November 2014
Joint meeting with Aston Pharmacy School at Birmingham. 'Nicholas Culpeper' by Dr Barry Strickland Hodge. Details later

Wednesday 15th October 2014
Poynter Lecture of the British Society for the History of Medicine. 'Preaching, Politics and Philanthropy: The Quakers in Pharmacy 1650 to 1900' by Dr Stuart Anderson at The Wellcome Building Conference Centre, 183 Euston Road, London, at 6.00 pm.
Registration is necessary to attend the lecture at http://www.bshm.org.uk/PoynterRegistration.asp
(Members of BSHP are affiliated members of BSHM.)

BSHP Conference 2015

The 2015 Conference will be held from Friday 27 March to Sunday 29 March in Sunderland. The cost will be held at £300, as this year.
The Conference will be at the Best Western Roker Hotel, Roker Terrace, Sunderland, Tyne And Wear, SR6 9ND. This is a sea front hotel about 1 mile from the city centre. There will be no pre-arranged activity for Saturday afternoon but Sunderland Winter-gardens have an interesting museum, or you can visit the National Glass Centre, The Washington Wetlands Centre, or Beamish Museum.
The main theme will be '*The Apothecary*' to commemorate the Apothecaries Act of 1815 but as the national commemoration of WW1 continues until 2018 papers or posters on either topic will be welcome together with contributions on pharmacy topics relevant to the North East and Sunderland. Paper or Poster titles to Shirley Ellis by the end of November please: shirleyellis@shirlellis.plus.com

Book Notice

Health care: A Postcard History of Twentieth-Century Attitudes and Practices
A new digital-only release from John K.Crellin and Flanker Press
Available from eBook retailers

Ever since their early twentieth-century "Golden Age", postcards on both sides of the Atlantic have recorded popular culture. Through humour, views of urban and rural places, photographs of individuals, fantasy, advertising, and succint messages, they have documented art and entertainment, social events, commercial practices, reform movements, political propaganda, and countless byways of society.

In this book, John Crellin explores the entertaining and creative ways that postcards relating to health care reflected and reinforced attitudes towards keeping fit, self-treatment and health care practitioners. Filled with colour images of these postcards, *Health care: A Postcard History of Twentieth-Century Attitudes and Practices* provides an in-depth examination of the cards' history and culture of medicine.

Due to the photo heavy nature of this publication, full colour ereaders, tablets or desktops are recommended.

Drug-induced toxic epidermal necrolysis – described in 1887

Axel Schneider[1], Axel Helmstädter[2]

[1]Institute of the History of Pharmacy, Philipps-University, Marburg, Germany

[2]Institute of Pharmaceutical Chemistry, Goethe University, Frankfurt/Main, Germany

A rather wide range of drugs is able to cause severe cutaneous adverse reactions. There is a variety of sometimes life-threatening mucocutaneous reactions including Stevens-Johnson syndrome (SJS) and Toxic Epidermal Necrolysis (TEN) which are regarded as two stages of a single disease. They are characterised by cutaneous erythema with blister formation of varying extent and haemorrhagic erosions of mucous membranes. SJS is characterised by skin detachment from up to 10% of the body surface area (BSA) while TEN, per definition, needs more than 30% skin affected. An overlap group of SJS/TEN has been defined with blisters and erosions between 10 and 30% of the body surface.[1] While Stevens and Johnson described the syndrome in the 1920s,[2] similar phenomena are also known as Lyell syndrome, referring to the British physician Alan Lyell (1917-2007)[3] who described four cases in 1956.[4] Two of these were related to drug intake, aspirin and phenylbutazone (Butazolidin). Lyell was fascinated by the topic and spent a great deal of his career on description and research on the subject.[5] This might be the primary reason for the development of this terminology although neither he nor Stevens and Johnson were the first in describing the reaction. It has been shown that the condition as such was already described much earlier without leaving traces in common terminology. Most authors refer to the report written by Gottfried Ritter von Rittershain (1820-1883), physician in a children's asylum in Prague, in 1878. He described in detail symptoms and the course of almost 300 cases in neonates with a mortality rate of approximately 50%.[6] So initially the disease was called Morbus Ritter von Rittershain which was, for obvious reasons, hardly accepted by the medical community. At the end of the 19th century, Jonathan Hutchinson also reported cases similar to those of Ritter von Rittershain, referring to newborn infants as well.[7] Historians hypothesise that the condition was described even decades earlier: in the Middle Ages[8] or in 1807 by the Viennese physician Joseph Plenck (1735-1807).[9] Most of these authors described neonatal cases and were unable to determine the actual cause of the disease. In retrospect, it is assumed that the symptoms were caused by *Staphylcoccus* toxins, a viewpoint supported by the fact that the reports point to epidemic occurrence in certain hospitals. Nowadays this condition is called Staphylococcal Scalded Skin Syndrome (SSSS) and separated from TEN which is known as a rare but serious adverse drug reaction. Synthetic drugs, however, were rare in the time of Rittershausen and the neonates he described had – as far as can be seen from his publication – not received drug therapy before the symptoms developed.

In this context it is worth noting that as early as 1887 TEN was described in detail as a side-effect of one of the first synthetic drugs, phenazone (Antipyrin®). This compound was synthesised by Ludwig Knorr (1859-1921) in 1883 and marketed as a febrifuge soon thereafter.[10] The Meister, Lucius and Brüning drug company, later known under the name Hoechst AG, distributed the preparation among a variety of physicians for test purposes and many literature reports about its effectiveness and also its adverse drug reactions were published in the late 1880s. Most physicians came to the conclusion that the drug had a reasonable benefit-risk ratio and the product was welcomed as a highly effective alternative to traditional methods of reducing elevated body temperature like hydrotherapy or substances erroneously regarded as generally useful febrifuges such as quinine. Life-threatening adverse effects were rarely reported.

Ein eigenthümlicher Fall von Dermatitis, hervorgerufen durch Antipyrinbehandlung.

Von

Dr. B. Spitz (Breslau)

Figure 1. Title of Spitz's publication. [A peculiar case of dermatitis caused by antipyrine treatment.]

Figure 2. Baruch Spitz (1854-1932).

One highly remarkable exception is a publication by the Jewish physician Baruch Spitz (1854–1932)[11] which almost doubtlessly describes an early case of TEN after phenazone ingestion (Fig. 1). He reported on a 20-year-old woman who had received Antipyrin in daily doses of 1-2 g/day. After one week she developed a measles-like, confluent exanthema accompanied by oedema of the lips and eyelids. Two days later large blisters developed and epidermis came off the body in large swathes. As Spitz described the 'whole body' being affected, this clearly has to be regarded as TEN, not only a Stevens-Johnson syndrome. The patient suffered from severe pain and was unable to open her eyes; her body temperature was moderately elevated. In the end, however, the patient recovered slowly *ad integrum*. The author concluded that Antipyrin may have unpredictable dangerous side effects in certain patients and complained that these could not be predicted.

Baruch Spitz (Fig. 2) was born in Kempen, a province of Posen (Kepno, Poznan, Poland), on December 31, 1854.[12] The Jewish name 'Baruch' means 'blessed'; he had received this name being the only surviving child of his parents. His father, Moritz Spitz (1818-1897) worked as a furrier. At the age of 9, Baruch moved to Breslau (Wroclaw) for higher education, and discovered his passion for antique language and literature. After having received his 'Abitur' [to leave school] he started to study medicine. He was appointed MD from Breslau university in 1879,[13] married Elise Honigmann in 1885 and soon thereafter became physician in the Breslau Jewish hospital (Fig. 3). Later, not being able to become medical director there, he opened a private practice in Breslau and eventually became 'Sanitaetsrath'. He died September 11, 1932.

Figure 3. Burgfeld, a very old street in Breslau. 7 Burgfeld housed a branch of the Jewish Hospital, where B. Spitz was Assistant Physician [1882 Directory].

The given example shows that not only common, but also rare, ADRs of therapeutically used new chemical entities were already being reported in the 19th century. It needs also to be highlighted that Baruch Spitz clearly deserves the honour of being regarded as one of the first, probably *the* first, to describe a drug-induced TEN after treatment with NSAIDs which were a completely new class of drugs at that time. Today, NSAIDs including phenazone, which is still available, are known to cause TEN and warnings are included but classified as rare in their Summary of Product Characteristics. NSAIDs were, however, highest ranked in the list of drugs responsible for causing TEN.[14] Among the four patients described in Lyell's initial publication, only one suffered from a severe drug reaction related to phenylbutazone. In his later years, the author himself admitted that what he had summarized as TEN most probably were three different conditions sharing prominent symptoms.[15] He suggested the term 'exanthematic necrolysis' for drug-induced cases but, following the tradition of medical terminology, it would easily be possible to call it 'Spitz Syndrome'.

Furthermore, it is interesting to see that such a rare adverse drug reaction was already described in the 19th century, long before any systematic approach to pharmacovigilance, before sophisticated clinical studies, and before the advent of medical statistics. The value of drugs was intensively discussed in meetings of the medical community and in journal articles which often also reported lectures presented to expert audiences. In the case of of phenazone (Antipyrin), for example, this led to an almost complete view of side-effects in a relatively short time. Standard textbooks about Adverse Drug Reactions (ADR) around 1900 already listed all the relevant side-effects,[16] including phenazone-induced severe cutaneous adverse reactions.[17] It seems clear that common ADRs were recorded early, but as is shown here, this was even the case for the rare event of a toxic epidermal necrolysis.

Acknowledgement

We thank Mrs Irene Newhouse, Kihei, Hawaii, great-grand-daughter of Baruch Spitz for information about Spitz's life, for providing the photographs and for language correction of this article.

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Endnotes and References

1. Mockenhaupt M. The current understanding of Stevens-Johnson syndrome and toxic epidermal necrolysis. *Exp Rev Clin Immunol* 2011; 7: 803-813.
2. Stevens AM, Johnson FC. A new eruptive fever associated with stomatitis and ophthalmia; report of two cases in children. *Am J Dis Child* 1922; 24: 526–533.
3. For life and work see McFayden T. Douglas S. Alan Lyell, MD (Cantab), FRCP (Ed), FRCP (Glas)

4th November 1917–2nd November 2007. *Clin Dermatol* 2008; 26: 575-80.
4. Lyell A. Toxic epidermal necrolysis: an eruption resembling scalding of the skin. *Br J Dermatol* 1956; 68: 355-61.
5. Lyell A. A review of toxic epidermal necrolysis in Britain. *Br J Dermatol* 1967; 79: 662-671; Lyell A. Toxic epidermal necrolysis (the scalded skin syndrome). A reappraisal. *Br J Dermatol* 1979; 100: 69-86.
6. Ritter von Rittershain G. Die exfoliative Dermatitis jüngerer Säuglinge. *Central-Ztg Kinderheilk* 1878; 2: 3-23.
7. Jackson R. Sir Jonathan Hutchinson on toxic epidermal necrolysis – an historical note. *Br J Dermatol* 1974; 91: 469-72.
8. Henning HD, Stiene HE. Ein Lyell-Syndrom im Mittelalter? *Dtsch Ärztebl* 1991; 81: A764-66.
9. Holubar K. Die Rittersche Dermatitis exfoliativa neonatorum und die toxische epidermale Nekrolyse (TEN). *Nova Acta Leopoldina* 2004; NF89 (334): 119-24.
10. Müller-Jahncke WD, Friedrich C, Meyer U. *Arzneimittelgeschichte*. Wiss. Verl.-Ges. Stuttgart 2005: 136-7; Sneader W. *Drug Discovery. A History*. Wiley, 2005: 125-7.
11. Spitz B. Ein eigentümlicher Fall von Dermatitis, hervorgerufen durch Antipyrin-behandlung. *Ther Monatsh* 1887; 1: 347-8.
12. Pretsch K. *Verzeichnis der Breslauer Universitätsschriften 1811-1885*, Breslau 1905, reprint Olms 1975, p. 157. Further biographical details were provided by Mrs. Irene Newhouse, Kihei, Hawaii, USA, greatgranddaughter of Spitz, which is gratefully acknowledged.
13. Spitz B. *Die Recurrens-Epidemie in Breslau im Jahre 1879*. MD thesis Breslau 1879.
14. Mockenhaupt (Ref. 1); Ring J. Drug-Induced Lyell's Syndrome (Toxic Epidermal Necrolysis). In: Pichler: *Proceedings of the 13th International Congress of Allergology and Clinical Immunology*. 1989: 455-461.
15. Lyell A. Requiem for toxic epidermal necrolysis. *Br J Dermatol* 1990; 122: 837-9.
16. Schneider A, Helmstädter A. *Adverse Drug Reactions of Phenazone; Knowledge from Books around 1900 compared to Today's Summary of Product Characteristics (SPC)*. Poster presentation 40th International Congress for the History of Pharmacy, Berlin, 2011, http://www.histpharm.org/40ishpBerlin/P42P.pdf
17. Lewin L. *Die Nebenwirkungen der Arzneimittel*. 2. Ed., Berlin 1893.

ISHP Newsletter

The International Society for the History of Pharmacy Newsletter for 2014 is available as a pdf file at www.histpharm.org/IGGP%20Newsletter_15_2014.pdf

Itching for a solution: How topical steroids became a standard treatment for eczema

Elizabeth Nally
Imperial College Medical School, London

Introduction

The discovery of cortisone has been hailed as the second most definitive moment of modern medicine after penicillin. Its story has been recounted numerous times, often encompassing rheumatic diseases, as it was in this speciality that cortisone was first used.[1] In 1948 Philip Hench, a physician at the Mayo Clinic, first treated his rheumatoid arthritis patients with cortisone. The results were extraordinary. One bedridden woman leapt out of bed and even attempted to dance.[2] Steroid therapy soon revolutionised treatment of the so-called 'relatives of arthritis', particularly dermatological conditions such as eczema. This paper aims to show how the making of cortisone into the standard treatment for eczema fundamentally changed clinical definitions and practices, turning it into a chronically manageable disease. This redefinition had important consequences for the care of eczema but also for eczema-drug research, development and marketing. A stable market emerged, which rather than generating innovation, resulted in little modification of the treatment regimen. It will also aim to show why, despite the limitations of steroids, for the past fifty years cortisone has stood head and shoulders above any other treatment in the management of eczema.

There is a substantial literature on the early history of cortisone use and production in Britain, but it focuses exclusively on rheumatic diseases. Viviane Quirke's detailed analysis of British cortisone manufacture in the 1950s and 1960s examines the role of Glaxo as the market leader and the company's joint endeavour with the Medical Research Council (MRC) and Ministry of Health (MoH) to make cortisone more widely available.[3] Her account has gone some way to show how cortisone revolutionised medicine but her focus is the British pharmaceutical industry, only using rheumatic disease to set a clinical scene for her cortisone story. She even concludes by stating that Glaxo's production of cortisone was 'largely an ad-hoc response to events, such as changing medical fashions'.[4] She emphasises the huge market for topical steroids by the 1960s but does not show how this impacted on skin diseases.

David Cantor takes a political outlook on the period, examining the years 1949-55 when the drug was first gaining momentum.[5] He places cortisone in a post-WWII context and explains how cortisone's early history in Britain is intertwined with that of the NHS. He too focuses on the rheumatic diseases, providing a detailed insight into how cortisone affected the speciality and the physicians working within it. As with Quirke, there is no discussion of the other conditions that were revolutionised by this 'wonder drug'.[6]

Despite the dramatic increase in prevalence of eczema during the second half of the twentieth century, its history has attracted very little attention.[7] This might be because historians of medicine have only just started to examine the history of chronic diseases. Mark Jackson makes passing reference to eczema in his history of allergy.[8] He presents the increasing trend in eczema prevalence and discusses the rise of hydrocortisone, only mentioning in passing the controversy that surrounded it. He mainly uses asthma to examine the increasing socio-economic impact of allergy after WWII and how pharmaceutical companies attempted to reap the benefits of this 'modern malady'. Whilst providing the most thorough analysis of allergy in Britain to date, Jackson does not examine eczema as a stand-alone condition. He fails to recognize how topical steroids, and their emerging controversies, changed the disease. Furthermore, he does not examine the role of British pharmaceutical companies in the shift from acute to more chronic diseases. These are areas that this paper hopes to study in greater detail.

Eczema before steroids

Approaches to the treatment of eczema have corresponded to the changing understanding of the disease. Humoralist and diathetist physicians perceived eczema as an external expression of a systemic disease; thus oozing of the skin was considered beneficial, as it acted to clear toxic humours. At the first international Congress of Dermatology in Paris in 1889, Philippe Gaucher, a French dermatologist at Necker hospital in Paris, stated:

> the skin disease is in a certain way a safety. If one makes it disappear, the elimination of the toxins is suppressed and can produce internal disturbances.[9]

These ideas began to be questioned at the turn of the 19th century. Sir Malcolm Morris[10], a consulting surgeon and lecturer at St Mary's Hospital and founder of the British Journal of Dermatology, denounced the 'laissez-faire' treatment approach of the French whilst Sir William Wilson,[11] lecturer at Middlesex Hospital and Chair of Dermatology at the Royal College of Surgeons, argued that dermatologists were, in essence, neglecting their patients by allowing the disease to just run its course.

British physicians were also becoming increasingly aware of the scale of the condition, declaring that it was by far the most frequent disease of the skin, with one in four dermatology patients presenting with a case of eczema.[12] Despite the growing trend, dermatologists in the 19th and early 20th century were quick to admit that there was no treatment to provide permanent relief of the incessant, eczematous itch.[13] They relied on a wide range of therapeutic options, taking into account both constitutional and local remedies, using them in an almost trial and error manner.[14]

Diagnoses of cutaneous diseases during the 19th and early 20th century were delineated depending on their primary lesion resulting in categories including 'porrigo' (scalp eruptions) (Fig. 1A),[15], 'lichen' (skin eruption connected with internal disorder and mainly affecting adults) (Fig. 1B)[16] and 'eczema' (eruptions due to an external cause such as exposure to toxic chemicals) (Fig. 1C)[17] which have all shown to be clinical precursors of the modern atopic eczema.

In 1930, Josef Jadassohn, professor of dermatology at Breslau University, spoke at the International Congress of Dermatology in Copenhagen and commented on the extreme confusion generated by the variety of diagnoses given to similar patients:

> nowhere have diagnoses in various university clinics varied so much as in this field – not to mention differences in nomenclature.[19]

By the 1930s, pre-eminence was given to local treatments once it was understood that eczema was not a presentation of a systemic disease. In 1933, Marion Sulzberger, an American-born dermatologist who trained in Europe and returned to the US, famously coined the name 'atopic dermatitis' which linked the skin disease to allergy and eliminated any rationale for treatments of a systemic disease.[20] The list of possible topical powders, lotions, pastes and dressings became extensive yet none prevailed as a truly effective symptom controller.[21] However, the efficacy of these local treatments was limited. This is evident by examining some of the extreme measures physicians were offering in an attempt to control scratching, especially in children. A C Roxburgh, lead physician at the dermatological department of St. Bartholomew's Hospital, even suggested tying the hands and feet of the child to the cot.[22]

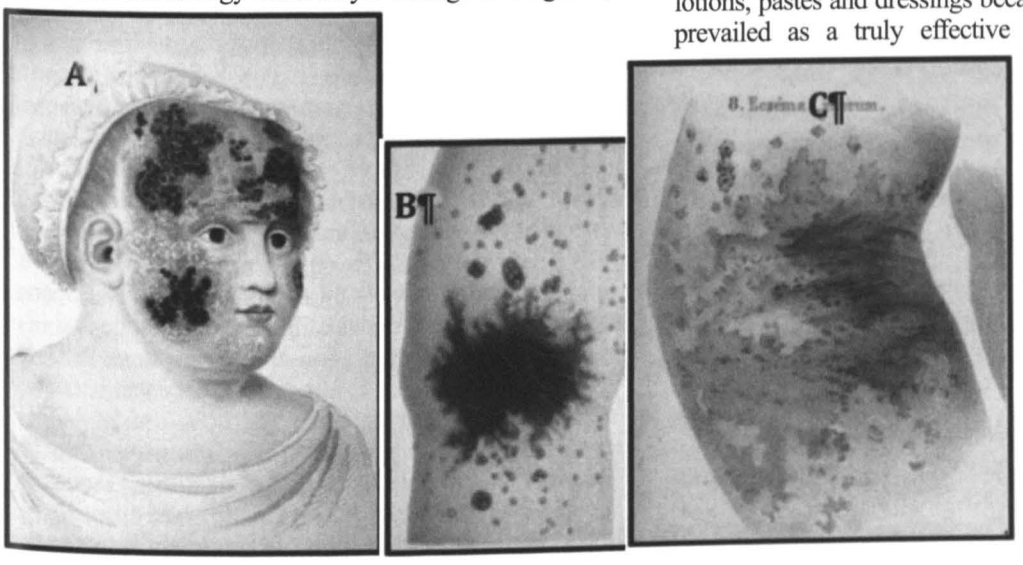

Figure 1. First representations of atopic dermatitis. **A**: Porrigo larvalis. **B**: Lichen agrius. **C**: Eczema rubrum.[18]

Eczema before steroids was a disease

defined largely in terms of its symptoms, and lacking a strong scientific definition based on a specific causal mechanism. The disease changed its presentation dramatically from day to day with exacerbations of the condition occurring sporadically. Sufferers desperate for any form of relief were targeted by advertisements for new remedies. For example, in 1913 *The Times* printed a series of announcements advertising the self-proclaimed 'world's greatest skin remedy: Ecsolent compound'. It was described to 'speedily banish eczema' and was 'strongly recommended by medical men.[23] The clinical uncertainties surrounding eczema opened it to all manner of patent medicines and cures, and also cast doubt on the professional expertise of dermatologists.[24]

Dermatologists recognised that with eczema there was a real lack of understanding resulting in no clear definition of the disease. In their *Introduction to Dermatology,* Norman Walker & George Percival, two distinguished British dermatologists, described eczema as a term 'which is a cloak of ignorance'.[25] They found that it was often applied to any sort of eruption of the skin when the observer was ignorant to what the actual aetiology was. There was a clear necessity to differentiate cases from the umbrella term eczema and to search out the cause of this inflammation that affected an ever-increasing population in Britain.

Emergence of cortisone

Hormones of the adrenal cortex (corticosteroids) were first investigated in 1929,[26] but research momentum only gathered pace during the 1940s. In 1941 rumours were circulating that Luftwaffe pilots were taking the hormones to increase their oxygen capacity in order to fly at higher altitudes.[27] Fear for the most part drove a large transatlantic research programme to manufacture steroids synthetically, even resulting in focus being shifted from other areas, such as penicillin.[28] The American pharmaceutical firm Merck was first to synthesise corticosteroids but production was not on a commercial scale and cortisone was first marketed at an astounding $1000 per gram. In 1948 Merck distributed nine grams of cortisone to Hench for his trial on rheumatic diseases.[29] Word of its success soon spread across the Atlantic where it was hailed a miracle drug. The *Lancet* described it as 'a therapeutic discovery of great importance'[30] whilst *The Times* reported, 'it would be as important to arthritis as insulin was to the treatment of diabetes'.[31] Opinion amongst British biochemists was uniformly pessimistic when asked whether they thought cortisone could be made affordable due to the difficulties in its synthesis.[32] However, evolution of clinical research in Britain post-WWII would allow British cortisone manufacture to become a reality.

Cortisone in post-WWII Britain

Clinical research in Britain was being transformed by two medical organisations: the MRC and the National Health Service (NHS). The formation of the MRC in 1913 acted to shape a national system of medical research in Britain. Bryder argues that from its birth, the MRC prioritised research in the laboratory, deeming clinical research to be a poor match against the 'pure sciences'.[33] Cantor supports this view, pointing out that Sir Walter Fletcher, Secretary of the Council up until 1933, believed medical research should not be in the hands of clinicians.[34] However, a culmination of events in the 1940s finally allowed clinical research to prosper. The MRC-conducted streptomycin trial of 1948[35] is commonly regarded as the world's first randomizsd controlled trial (RCT).[36] The timing was no accident. It coincided with the creation of the NHS in 1946. This combination of government funding for medical research and a health service where research on patients could be carried out proved to be a recipe for success, and allowed cortisone research in Britain to advance.[37]

British trials into cortisone and rheumatism first began in 1949. The MRC formed an advisory committee to promote research into the speciality, focusing specifically on the effects of cortisone. Further studies by Hench at the Mayo clinic showed that the drug could also manage many other diseases, particularly diseases of the skin. In August 1950 the Ministry of Health listed over ten conditions where cortisone was effective. The research programme was rapidly expanded[38] and panels were appointed in ophthalmology, haematology and, most importantly to this account, dermatology.[39]

The dermatology panel's first meeting was held in the offices of the MRC in 1951. The panel consisted of nine of the leading skin physicians in the country, led by J.T Ingram, lecturer in diseases of the skin at Leeds University and physician in charge of the dermatological department at Leeds Infirmary.[40] Their aim was clear – to investigate the use of corticotrophin (ACTH) and cortisone in the treatment of skin disease and to conduct clinical trials. Fifty grams of cortisone and twenty-four grams of ACTH were made available to their research by Merck and distributed accordingly. Upon deciding which conditions they wished to investigate, chronic eczema was top of their agenda due to its widespread prevalence.

In December 1954 the panel published its first report on the dermatological applications of systemic cortisone and ACTH.[41] The results were conclusive. The response of the eczematous reaction was dramatic, but once treatment was withdrawn, relapse was almost inevitable. A further study looked specifically at its effect on infantile eczema (a debilitating form of the disease specifically affecting infants and young children). Of the eleven children treated, only three saw any form of improvement and two of these soon relapsed.[42] The panel recognised the limitations of systemic cortisone and in a letter addressed to the Minister of Health in 1953, F. Hellier, dermatologist at Leeds Infirmary and secretary for the MRC panel on cortisone and ACTH, recommended against making the drug available for common skin complaints such as eczema, especially considering its short supply in Britain at the time.[43]

Comparisons at this point can be drawn between the eczema and the rheumatism stories. After the initial wave of enthusiasm about cortisone an air of scepticism arose.

A 1949 editorial in the *Lancet* approached the discovery with caution stating, 'a therapeutic discovery of the first importance, and it is one that arouses many speculations.' David Cantor describes two factors that undermined the portrayal of cortisone in rheumatic diseases during the early 1950s; the first being the persistent shortages of the drug and the second being its potential to cause harmful side effects.[44] These limitations could also be applied to cortisone's use in eczema.

Redefining Eczema

In 1952 a landmark event, attended by dermatologists from across the globe, returned to the international scientific calendar. The Tenth International Congress of Dermatology was held in London, seventeen years since the last Congress in Budapest – a delay brought about by the Second World War.[45] The President that year was Sir Archibald Gray, a British dermatologist held in high regard for securing the speciality's position in the field of medicine.[46]

Of the three discussion topics, the first was, predictably, concerning cortisone and ACTH. Marion Sulzberger, now head physician at the New York Skin and Cancer Hospital and eminent figure of global dermatological research, presented findings that correlated with those of the MRC. He recognised the side effects yet his stance on using oral cortisone in chronic skin conditions such as eczema was not wholly negative:

> Because of the undeniably serious risks, some have said that such agents as ACTH and cortisone should not be used except in dermatoses which are ordinarily fatal. But I submit that physicians must never forget that there are diseases which do not endanger life, but ruin it.[47]

The second discussion topic involved the pathogenesis of eczema. John Belisario, Consultant Physician for Diseases of the Skin at the Royal Prince Alfred Hospital in Sydney and founder of the Dermatological Association of Australia, compared a 'befuddled man studying an obscure problem to the philosophical detachment of a dermatologist contemplating an eczema'.[48] His remark highlights yet again the apparent difficulty in defining a chronic disease that can change dramatically from day to day. He argued that the lack of a unanimous concept had impeded progress in the condition. Donald Pillsbury, a physician at the Department of Dermatology at the University of Pennsylvania echoed his sentiment and explained that casual terminology had resulted in 'great bewilderment to the physician'.[49] Both attempted to classify the many different types of eczema. For example, Pillsbury used a series of charts (Figure 2) in his presentation to show the relative role of factors which proved significant in terms of aetiology. It would be naïve to assume the timing of these two discussions was coincidental. The discovery of cortisone emerged at a pivotal point in the history of

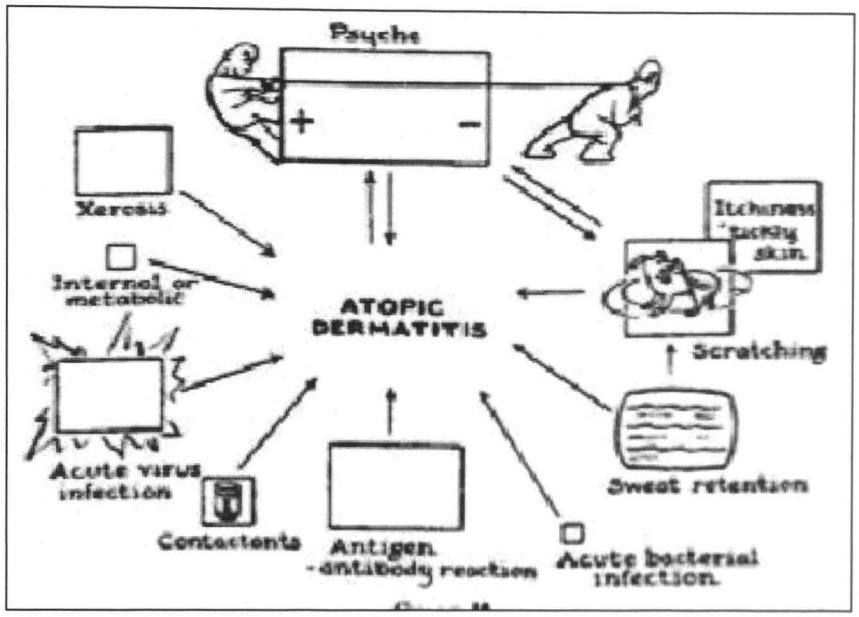

Figure 2. Pillsbury's charts aimed to show the various causes that had been discovered through recent research of each specific type of eczema, in this case atopic dermatitis, and their interplay. He even considered the psychological impact the disease.[50]

medical research in Britain. Cortisone provided the catalyst for clinical trials into eczema and its treatment to take place and with it a demand to define the condition that had relied previously on subjective opinions. Moreover, efforts to define eczema were strengthened by the emergence of this radical treatment. The changing presentation of eczema meant that the effectiveness of cortisone treatment was difficult to evaluate. In order to establish whether it was having a true effect the disease required delineating.

Topical steroids

As dermatologists tried to define eczema more precisely in the early 1950s, cortisone researchers at the same time grappled with problems of using the new drug for common skin diseases, including eczema. Side effects reported by the MRC in cases of rheumatism included salt retention and severe depression and increased susceptibility to infection.[51] J Walker, a medical doctor working for Glaxo, concluded in 1952 that cortisone had 'very serious and yet incompletely undefined limitations'.[52] However work continued on the drug in America and new analogues soon emerged from pharmaceutical laboratories. In the same year the introduction of topical hydrocortisone provided a major pharmacologic breakthrough for dermatotherapy. Sulzberger and Witten's research proved it effective in six of eight patients with atopic dermatitis.[53] Hydrocortisone was welcomed as the naturally occurring, active hormone of the adrenal gland and so it was hoped that it would provide the solution to some of the problems seen with cortisone therapy. The MRC's dermatology panel began research into the ointment immediately. They performed a trial into its effects on various types of

Table 1. Response of different types of eczema to topical hydrocortisone treatment. 'Cured' column refers to cases where the eczema has been caused by an external influence and removal has caused remission of the disease.[55]

Disease	Cured	Improved	Unaffected	Worsened	Total
1.Infantile Eczema	1	52	26	13	92
2. Exogenous & Contact	7	7	8	0	11
3. Patchy, Discoid and Nummular	3	8	0	0	11
4. Pompholyx	5	8	5	1	19
5. Seborrhoeic Dermatitis, Flexural Infective or Acute Neurodermatitis	19	29	9	0	57
6. Atopic, Besnier's Prurigo, Lichen Simplex & Chronic Neurodermatitis	26	32	15	5	78
7. Other Eczemas	8	15	3	4	30

eczemas and the results were fairly conclusive. The majority of patients saw an improvement of their condition (Table 1) and, most importantly, side effects were negligible.[54]

By 1954 the MoH was pushing to make this treatment more widely available. The matter was discussed at the seventh meeting of the panel where it was concluded that 'since there was no danger involved' they saw no reason to advise the Ministry to refuse or delay permission for manufacturers to put the ointment on the market.[56]

Despite the MRC panel's lack of concern about topical steroids, a letter between FHK Green (MRC assistant secretary) and F Hellier in 1954 tells a different story. Hellier addressed the issue of making hydrocortisone ointment available to general practitioners (GPs), which the MoH was under pressure to carry through.[57] Hellier's tone is one of caution:

> Hydrocortisone ointment is only a suppressive agent and not a curative one. In consequence once a patient has started to use it and found it beneficial then very likely he will wish to continue indefinitely and so once a patient has been launched on a career of hydrocortisone he may require it for months or even for the rest of his life.[58]

He recommended against making the therapy available for GPs. Nonetheless, Hellier's decision appears based on economic considerations rather than on the adverse effects of the therapy. His worry is that demand for the creams will exceed supply. He states that many of the conditions would respond 'quite satisfactorily' to routine treatment with 'much cheaper remedies'. So what appeared to be limiting the availability of topical steroids at this early point in their history was not concern over side effects but their price tag.

Hellier's concern about supply and demand of topical hydrocortisone was soon to become a distant memory as collaboration between the MoH and British manufacturers, particularly Glaxo, worked to make cortisone, and its new analogues, more widely available in Britain. Back in 1950 the MoH considered it imperative that companies start manufacturing the drug as soon as possible.[59] However, the NHS was under considerable pressure amidst concerns about the rising costs of drugs it provided. The Ministry found itself having to balance the two issues; stimulating cortisone production whilst limiting its availability to certain hospitals.[60] However, by 1954 cortisone production in Britain began to stand on its own two feet. Although it still fell short of the minimum potential needs if all patients who could benefit from the drugs were to receive treatment,[61] British production was now in excess of NHS requirements at the time.[62] With the backing of the MRC panels, 5th December 1955 was set as the release date for cortisone to be made available to the public on prescription.[63]

Topical treatment post 1955

The release of hydrocortisone to the open market and to GPs in 1955 was a major leap in the development of topical steroids as a standard treatment for eczema. Now that Britain had its own source of cortisone and hydrocortisone, the MoH no longer had to rely on expensive imports from America. Competition between companies on the price of the drugs acted to drive down the cost over the late 1950s. Glaxo, despite being the market leader in Britain, was under pressure from other companies in France (Roussel) and America (Upjohn). In August 1956 Glaxo resigned to reducing their price by 15% to match Roussel.[64] The reduced price knocked down the barrier that had previously prevented widespread use of steroid creams for eczema. In January 1961, *The Times* reported a further price cut in cortisone derivatives by Glaxo, the largest cut made by any firm since 1956.[65] Harry Jephcott, chairman of Glaxo remarked in July 1952 that there would always be restraint placed upon the use of cortisone so long as it remained relatively expensive.[66 67] By the 1960s however it was clear that hydrocortisone's price barrier had been broken down.

The combination of hydrocortisone being widely available through prescription and its affordability for the NHS meant that people with eczema were using the creams much more readily. The rise of hydrocortisone also meant that research into topical steroids increased. By 1960 five different analogues of hydrocortisone had been developed, many of them with increased

penetration and potency.[68] These more potent creams were placed on the market from 1960.

The Topical Steroid Market

Medical historians and epidemiologists have often characterised the post-war period as the moment in which developed countries went through a fundamental 'epidemiological transition', from an age dominated by acute diseases to one dominated by chronic diseases. Typically, this has been explained as a natural demographic process. Yet, Jeremy Greene has argued that, in the United States, it was importantly facilitated and shaped by the massive expansion of pharmaceutical companies, who created new markets for drugs aimed specifically at chronic conditions.[69] Not only did pharmaceuticals create new drug markets, argues Greene, they also created new diseases for their products. Mark Jackson has made a similar observation in his analysis of the role of the British pharmaceutical industry in shaping the identity, experience and prevalence of allergy.[70] Like allergy, eczema also became an important new market for British pharmaceuticals.

The rising epidemic of eczema during the second half of the twentieth century provided an important opportunity for British pharmaceuticals. Research carried out in 1984 looked at rates of reported eczema in children born in 1946, 1958 and 1970. Overall rates rose from 5.1% in children born in 1946, to 7.3% in those born in 1958 and to 12.2% in 1970.[71] Figures compiled in 2003 suggested that this trajectory continued, with the prevalence of eczema in Britain increasing roughly threefold between the 1970s and 1990s.[72]

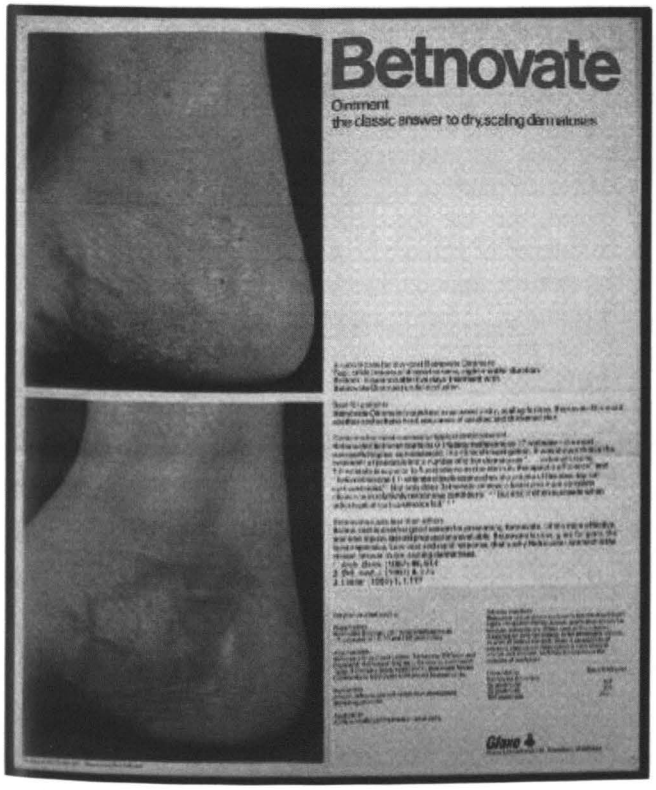

Figure 3. Advertisement for Betnovate dating from 1969. Glaxo used dramatic before and after photos to emphasise the effects topical steroids could have on eczema.[75]

Responding to the growing demand for eczema treatments, in 1957 Glaxo changed tactics and began to initiate collaborations with other companies. Their most important relationship proved to be with the American giant Schering which led to their first novel medicine, Betnovate.[73] Betnovate was launched in 1963 and soon became the market leader in the treatment of eczema thanks to clever marketing by the company.[74] (See Figure 3).[75]

Between 1966-1967 Betnovate sales represented 36% of the group's pharmaceutical turnover.[76] By 1969, sales of Betnovate had overtaken those of all Glaxos' antibiotics.[77] Glaxo soon became the market leader in topical corticosteroids with the launch of Dermovate [clobutasol] in 1973 and Eumovate [clobutasone] in 1975.[78]

The exponential rise seen in eczema post-WWII occurred alongside the growth of the topical steroid market. Greene would argue that Glaxo's mutually constitutive processes of clinical research, clinical practice and medical marketing into topical steroids expanded eczema as a chronic disease causing more people to receive the 'eczema diagnosis'.[79] However the rapid growth in the topical steroid market in Britain was not universally welcomed.

The backlash against topical steroids

For medical experts and regulators, the topical steroid market raised concerns about the appropriate use of treatments by GPs. Hellier had feared that GPs would prescribe hydrocortisone for every type of eczema even when it may not be wholly appropriate and that patients would demand treatment for all kinds of skin problems.[80] With an open market for topical steroids, reduced cost and their availability to GPs, Hellier's fears appeared to come true.

The initial enthusiasm and lack of caution in the use of topical steroids led to over-prescription and over-use. The creams were often applied over prolonged periods of time and the long-term unwanted effects of topical steroids became increasingly evident.[81] A number of journal articles, first appearing in 1963, reported adverse skin changes that had occurred as a result of topical steroid use. Early reports described skin atrophy when topical steroids had been used regularly for months and years. One particularly shocking study presented eleven children who had been prescribed a potent fluorinated steroid for facial eczema. After months of use they presented with 'bright malar flush, small superficial papules, pustules and scaling'. They termed it the 'rebound phenomenon' (Figure 4).[83] Patients would see deterioration with the steroid but it wouldn't be recognised by the GP so more would be prescribed causing a vicious circle. The aim of the publication was clear, to raise awareness of this horrific possibility.[82]

In 1976 J Kirby and D Munro, consultant dermatologists at St Bartholomew's Hospital, published an article describing atrophic effects even after short-term use. They placed the blame with the pharmaceutical companies:

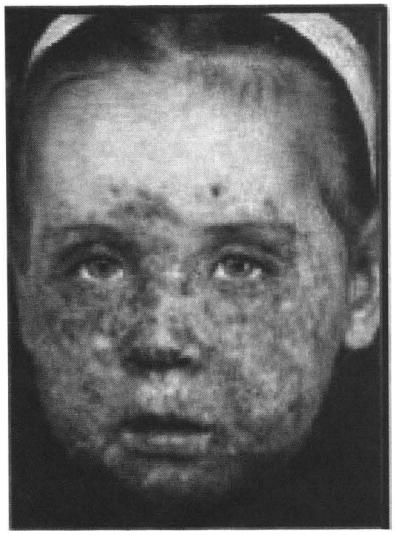

Figure 4 . The so-called 'rebound phenomenon'. An acute exacerbation presented after use of topical fluorinated steroids. In this young girl there was markedly increased pustulation and scaling of the skin.[83]

> The problem is magnified when clinicians are unsure of the skin-thinning potential of a new corticosteroid. Misleading and flimsy evidence, provided by some manufacturers to allay our fears, complicates the problem. For these reasons it is essential to examine the skin-thinning properties of a topical corticosteroid before it is widely used in clinical practice.[84]

The point these researchers make is a reasonable one. When the creams were first released there was little information about how to administer them, probably because no adverse effects were known so they were deemed of little danger. In 1967 writing for *The Times,* a professor at a London teaching hospital called for greater information to be provided to the prescriber. He highlighted the importance of education for the doctor on modern prescribing, especially with the magnitude of changes that had been seen in medicine since the 1950s.[85]

In response to the growing controversy, pharmaceutical companies developed ways to deflect criticism and improve the public image of topical corticosteroids. The eczema market was huge and loss of sales in these products would have had great financial consequences. Glaxo published practical guides in 1977 and 1978 containing detailed information on Betnovate, Dermovate and Eumovate and how to prescribe them.[86] They also produced a film targeted at GPs titled 'Topical steroids in allergic and eczematous conditions'.[87]

Despite the backlash, topical steroids still played a key role in eczema treatment. They enabled eczema patients to exert some sort of control over a condition that dramatically diminished their quality of life. Hugh Jolly, consultant paediatrician at Charing Cross Hospital commented on steroid use in eczema for *The Times* in 1975 when the side effects were well established:

> This is not the complete answer to eczema but used correctly it is the most valuable preparation in the doctor's armamentorium. Cortisone applied first as a lotion and later as an ointment can transform an itching red oozing skin in a matter of hours.[88]

Jolly stressed that as with any drug there were risks, but with correct use, topical steroids were highly effective at controlling eczema exacerbations, especially in children. However, a dramatic shift in public opinion had already occurred as a result of the few catastrophic outcomes of fluorinated steroid use in the 1950s. This view solidified in many people's mind causing a fear and avoidance of steroid treatment for years to come.[89]

Conclusion

This study aimed to show how topical steroids transformed both the definition and management of eczema. Prior to their discovery, eczema was a chronic disease that lacked clinical criteria and effective treatment regimens, leaving patients struggling to manage the debilitating disease. The arrival of an effective topical treatment in hydrocortisone acted to revolutionise the condition, particularly in those suffering from severe forms of the disease. The emergence of topical steroids in Britain post-WWII occurred at a time of prosperity in clinical research allowing for greater understanding of the causal mechanisms of the disease.

Le Fanu's story of cortisone is the classic one, in that corticosteroids revolutionised treatment of chronic conditions.[90] However, for eczema, making steroids a standard involved more negotiation than the heroic story allows. Topical steroids were often mistaken as a cure when in reality they only suppressed the symptoms for a short period of time. After huge early enthusiasm, there was considerable backlash after the long term side effects of the more potent creams emerged.

Yet, despite their misgivings, topical steroids remained a standard in controlling eczema, which dramatically increased in prevalence over the second half of the twentieth century. Focus had shifted away from acute, infectious diseases and now lay heavily with the increasing burden of chronic conditions. As Greene argued for the case in America, 'the expanding prevalence of chronic disease evident by 1950s offered the perfect opportunity to redesign the drug-disease relationship'.[91] Glaxo prevailed as leader of the topical steroid market in Britain. Their topical hydrocortisone creams defined eczema through their effectiveness as a treatment, as a research tool and as a marketing vehicle.[92] Their ability to treat eczema, a previously unmanageable chronic disease, demonstrated the importance of pharmaceuticals to the lives of patients suffering with the condition.

My research into this topic has highlighted the limited historical reflection on eczema, a condition that has seen an exponential rise in prevalence over recent decades. My research examined how topical steroids changed eczema in Britain whilst also taking into consideration the socio-economic climate surrounding a shift in disease pattern from acute to chronic disease. However, this shift didn't just occur in Britain, so in order to further support the claim that eczema was defined by the topical steroid market further study needs to be done to examine the disease in developed countries across Europe and further afield.

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Endnotes and References

1. Le Fanu J. *The Rise & Fall of Modern Medicine.* London: Abacus, 1999: 27.
2. Glyn J. The discovery and early use of cortisone. *Journal of the Royal Society of Medicine* 1998; 91: 513-517.
3. Quirke V. Making British cortisone: Glaxo and the development of corticosteroid drugs in the UK in the 1950s and 1960s. *Studies in History and Philosophy of Biological and Biomedical Sciences* 2005; 36: 645-674.
4. Quirke V, Reference 3: 672.
5. Cantor D. Cortisone and the politics of drama, 1949-55. In Pickstone J (eds). *Medical innovations in historical perspective.* London: Macmillan Press Ltd, 1992: 165-184.
6. Szpilfogel S. Adrenocortical steroids and their synthetic analogues. In Parnham M and Bruinvels J (eds). *Discoveries in pharmacology, Vol. 2. Haemodynamics, hormones and inflammation.* Amsterdam: Elsevier, 1994: 253-284.
7. Taylor B, Wadsworth J, Wadsworth M et al. Changes in the reported prevalence of childhood eczema since the 1939-45 war. *Lancet* 1984; 2: 1255-1257.
8. Jackson M. *Allergy: The History of a Modern Malady.* London: Reaktion Books Ltd, 2006.
9. Gaucher E. Pathogénie et métastases de l'eczéma particulièrement chez les enfants. In *Congrès international de dermatologie et de syphiligraphie tenu a Paris en 1889.* Paris: Masson, 1890: 542-545.
10. Morris M. *Diseases of the skin.* London: Cassell and Co Ltd, 1894.
11. Wilson E. *Diseases of the skin.* London: John Churchill & Sons, 1867.
12. M'Call-Anderson T. *Treatise on diseases of the skin.* London: Charles Griffin and Company, 1894: 115.
13. Semon H & Moritz A. *An atlas of the commoner skin diseases.* Bristol: John Wright & Sons, 1934.
14. M'Call-Anderson T. Reference 12: 115.
15. Bateman T & Willan R. *Delineations of Cutaneous Diseases: Exhibiting the Characteristic Appearances of the Principal Genera and Species Comprised in the Classification of the Late Dr. Willan and Completing the Series of Engravings Begun by that Author.* London: Longman, 1817.
16. Willan R. *On cutaneous diseases.* London: J Johnson,1808.
17. Bateman T. *A practical synopsis of cutaneous diseases according to the arrangement of Dr Willan, exhibiting a concise view of the diagnostic symptoms and the method of treatment.* London: Hurst, Rees, Orme, and Brown, 1813.
18. Wallach D, Coste J, Tilles G et al. The first images of atopic dermatitis: An attempt at retrospective diagnosis in dermatology. *Journal of the American Academy of Dermatology* 2005; 53: 684-689.
19. Jadassohn J. In Engelsen & Schröder. (eds), *VIIIème Congrès international de Dermatologie et de syphiligraphie, rapports et Co-rapports.* Copenhagen, 1930, 38.
20. Sulzberger M & Wise F. *The Year Book of Dermatology and Syphilology,* The Year Book Publishers, 1933: 28-39.
21. Roxburgh A. *The General Practice Series: Common Skin Diseases.* London: HK Lewis & Co, 1937.
22. Roxburgh A. Reference 21: 288.
23. Ecsolent Compound. *The Times,* London. 22 October 1913: 5
24. Bigby M. Snake oil for the 21st century. *Archives of Dermatology* 1998; 134: 1512-1514.
25. Walker N, Percival G. *An introduction to dermatology.* Edinburgh: W Green & Son, 1939: 98.
26. Mason C, Myers C, Kendal E. The chemistry of crystalline substances isolated from suprarenal gland. *Journal of Biological Chemistry* 1936; 114: 613-31.
27. Birch A. Steroid hormones and the Luftwaffe. *Steroids* 1992; 57: 363-377.
28. Slater L B. Industry and academy: The synthesis of steroids. *Historical Studies on the Physical Sciences* 2000; 30: 443-479.
29. Glyn J. Reference 2: 515
30. Anon. Suprarenal hormone in rheumatoid arthritis. *Lancet* 1949; 253: 786.
31. New treatment for rheumatism. *The Times*, London. 24th November 1949: 9.
32. Glyn J. Reference 2: 514
33. Austoker J, Bryder L. Preface. In Austoker J & Bryder L (eds). *Historical perspectives on the role of the MRC.* Oxford: Oxford University Press, 1989: v-vii.
34. Cantor D. The MRC's support for experimental radiology during the inter war years. In: Austoker J & Bryder L (eds). *Historical perspectives on the role of the MRC.* Oxford: Oxford University Press, 2008: 181-204.
35. Anon. Streptomycin treatment of pulmonary tuberculosis. *British Medical Journal* 1948; 2: 769-782.
36. Valier H, Timmermann C. Clinical Trials and the Reorganization of Medical Research in Post-Second World War Britain. *Medical History* 2008; 52: 493-510.
37. Reynolds L, Tansey E. *Clinical Research in Britain, 1950-1980.* Wellcome Witnesses to Twentieth Century Medicine. London: Wellcome Trust, 2000.

38. Copeman W. *Cortisone and ACTH in Clinical Practice.* London: Butterworth, 1953: 48.
39. Letter to secretary, 26 October 1951, MRC Archives, file1063/31/9.
40. MRC Dermatology Panel on Cortisone. Minutes from first meeting, 20 March 1951, National Archives, FD 1/7175.
41. Anon. Treatment of skin disorders with A.C.T.H. and cortisone; first report of the Medical Research Council panel on the dermatological applications of A.C.T.H. and cortisone. *British Medical Journal* 1954; 2: 1307-1313.
42. Treatment of skin disorders with ACTH, cortisone, hydrocortisone and fluorohydrocortisone – Dermatology Panel, National Archives, FD 1/7182.
43. Hellier correspondence with the Minister of Health, 23 April 1953, National Archives, FD 1/7176.
44. Cantor D. Reference 34: 183.
45. British Medical Association.*Tenth International Congress of Dermatology.* London: The Garden City Press, 1952: vii.
46. Anon. Progress in dermatology. *British Medical Journal* 1952; 2: 274-276.
47. Sulzberger M. Allergic Dermatoses and reactions. In British Medical Association (ed.) *Tenth International Congress of Dermatology.* London: The Garden City Press Limited, 1952: 148.
48. Belisario J. The Pathogenesis of Eczema. In British Medical Association (ed). *Tenth International Congress of Dermatology.* London: The Garden City Press Limited, 1952: 3.
49. Pillsbury D. The Pathogenesis of Eczema. In British Medical Association (ed). *Tenth International Congress of Dermatology.* London: The Garden City Press Limited, 1952: 60.
50. Pillsbury D.Reference 49: 60.
51. Complications of ACTH and Cortisone. Report by MRC, National Archives, 1951-1953, FD 1/643.
52. 'Cortisone 1951-1952': Walker to Jephcott et al., 19 May 1952, GSK GGA 295.
53. Sulzberger M & Witten V. The effect of topically applied compound F in selected dermatoses. *Journal of Investigative Dermatology* 1952; 19: 101.
54. MRC Report. External treatment with hydrocortisone and fluorohydrocortisone, National Archives, 1954-1956, FD 1/7180.
55. MRC Report. External treatment with hydrocortisone and fluorohydrocortisone, National Archives, 1954-1956, FD 1/7180.
56. Minutes from seventh meeting of the dermatology panel, 11 May 1954, National Archives, FD 1/7179.
57. Sir Weldon Delrymple-Champneys correspondence with Green, 8th December 1954, National Archives, FD 23/1664.
58. Green correspondence with Hellier, 14th December 1954, National Archives, FD 23/1664.
59. Ibid. Minute sheet, September 1950.
60. Quirke V. Reference 3: 652.
61. Public Record Office. MH 136/35: Wilkinson 12 April 1954.
62. Quirke V. Reference 3: 653.
63. 'Cortisone 1955': Jephcott to Palmer, 28 September 1955, GSK GGA 195.
64. Quirke V. Reference 3: 664.
65. More drug prices to be cut. *The Times*, London. 17 Jan 1961: 7.
66. Jephcott H. Cortisone. 1 July 1952, Glaxo archives, Box D1/1/40.
67. Cantor D. Reference 5:166.
68. www.topicalsteroids.co.uk Accessed 6 May 2013.
69. Greene J. *Prescribing by Numbers.* Maryland: John Hopkins University Press, 2007.
70. Jackson M. Reference 8.
71. Taylor B, Wadsworth J, Wadsworth M et al. Reference 7: 1255-1257.
72. Child eczema 'has tripled since 1970s'. *The Guardian*, London, 23 December 2003: 16.
73. Quirke V. Reference 3: 666.
74. Jackson M. Reference 8: 133.
75. Betnovate (topical steroid: eczema, seborrhoea, contact dermatitis, psoriasis). Drug advertising ephemera. Box 41. Wellcome Library, archives and manuscripts collection.
76. Jones E. *The business of medicine.* London: Profile Books, 2001: 246-247.
77. Quirke V. Reference 3: 668.
78. Quirke V. Reference 3: 319-324.
79. Greene J. Reference 69: 225.
80. Green correspondence with Hellier, 14th December 1954, National Archives, FD 23/1664.
81. Ring J, Przybilla B & Ruzicka T. *Handbook of Atopic Eczema.* Germany: Springer-Verlag Berlin Heidelberg, 2006: 482.
82. Savin J, Alexander S & Marks R. A rosacea-like eruption of children. *British Journal of Dermatology* 1972; 87: 425.
83. Savin J, Alexander A & Marks R. Reference 82: 428.
84. Kirby J, Munro D. Steroid-induced atrophy in an animal and human model. *British Journal of Dermatology* 1976; 94: 111-119.
85. Information for the prescriber. *The Times*, London. 15 December 1967: IV.
86. Selective use of topical steroids in skin disease: prescribers guide. Greenford: Glaxo Laboratories, 1977 & 1978.
87. *Topical steroids in allergic and ezcematous conditions.* (1971) [Film reel] .
88. What to do about eczema. *The Times*, London. 18 June 1975: 7.
89. Bewley A. Expert consensus: time for a change in the way we advise our patients to use topical corticosteroids. *British Journal of Dermatology* 2008; 158: 917-920.
90. Le Fanu J. Reference 1: 27.
91. Greene J. Reference 69: 2.
92. Greene J. Reference 69: 225.

Why Did It Take So Long? Pharmacology in Pharmaceutical Education

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Pharmacology was introduced into the syllabus for the Pharmaceutical Chemist Qualifying Examinations in 1950 in preparation for the first examination in *Physiology and Pharmacology* in June 1952. The subject had been purposely omitted from pharmaceutical education[1] in the early days of the Pharmaceutical Society and was not to be included for over a century.

Earlier papers[2] have attempted to follow the time-scale of inter-professional and political argument, legal enactments and other changes that affected the Pharmaceutical Society and which, therefore, resulted in this situation. Such a view, however, is very restricted as it does not allow for any exploration of the actual subject of pharmacology or for the consideration of any possible attitudes or opinions regarding it which may have supported, or opposed, the need for future pharmacists to be formally educated about the action of the drugs they were dispensing or selling. It, certainly, does not explain why it took so long for the subject to be finally included.

In 1839 the first volume of Dr Jonathan Pereira's *Elements of Materia Medica* was published. The author was a well established and respected teacher of medical students and intended his work to be an up-to-date text-book for them. It included a study of the action and uses of medicines. In 1842 he was appointed as the first Professor of Materia Medica at the School of Pharmacy, where the subject was effectively restricted to medical botany and pharmacognosy.

Before looking specifically at the subject of pharmacology, it would be helpful to have a brief 'overview' of some of the theories and ideas relating to medicine at the time. As we are aware, Dr Pereira published in 1839 and the Pharmaceutical Society was formed in 1841. Thus, the opinions brought forward from the previous century, together with those proposed during the interim years, were of particular importance.

At the start of the century, doctors would rely on their knowledge of the patient and their observation of all of the symptoms manifested by the disease. Their aim would be to treat the symptoms and restore the natural balance of the body and, by so doing, bring the patient back to full health. An important part of this would relate to the patient's diet and environment which would be regulated accordingly. However, they also had a very wide variety of medicines which could be used to assist in the process. At this time drugs were expected to assist the restoration of the body's natural balance, but were not expected to specifically act upon, or cure, the disease. Preparations were available to reduce specific symptoms; among these were *emetics, cathartics or purgatives, tonics, expectorants, sialagogues* (promoting salivation), *diuretics, sedatives, stimulants* and many more. To this list has to be added blood-letting, with or without the addition of drug treatment.

By the end of the 18th Century, and into the early years of the 19th, ideas and theories were being expounded which moved away from this 'whole body' concept of disease. In his *Treatise on Membranes* Bichat in 1799 had proposed that disease affected the tissues of the organs of the body. However, it was not until 1839 that Schwann published a paper indicating that he had found cells in all animal tissues. This was followed by the work of Virchow in the 1850s developing the concept of cellular pathology, resulting in the publication of his *Die Cellularpathologie* in 1858. Thus, medical theory had slowly moved towards the realisation that disease affected the tissues and organs and, finally, that it was seated at the cellular level, which would, at least, open the pathway towards the consideration of drug action being similarly sited. However, back in the first four decades of the century, uptake of new ideas was very slow and it has to be remembered that no-one had any knowledge of how a medicine actually worked.

Dr Pereira made reference to this last point very early in his own work. In the *Preface* he explained that he used the 'order of their natural-historical relations', based on external form and structure, to classify medicines. However, he made it clear that a classification based on their action and uses would be far superior, if it could be produced. Unfortunately, he considered that lack of knowledge of how medicines actually act on the body, the fact that 'scarcely two medicines give rise to precisely the same effects' and that different writers had widely divergent views as to the principal action for the same drug made this impossible. He supported this last statement by quoting several physicians and writers who had five different opinions regarding the principal action of opium and ten regarding that of mercury. It is notable that, at the time, the vast majority of drugs available to the medical profession were of vegetable origin, together with a number of chemical substances such as mercury, antimony, sulphur, iron etc. Thus, if he was unwilling to trust a classification based on their action and uses, then one based on their external form and structure, which effectively involved a botanical classification of the plants involved, would appear to be a logical alternative.

Unfortunately, acceptance of this suggestion does not give any indication of how it was possible for a number of eminent medical men to have widely differing views about the principal action of specific drugs. At this stage in the development of *pharmacodynamics*, which we now know as pharmacology, every action and use of a particular drug would be noted, including, in the case of poisons, their ultimate effect. To put this into context it may help to consider a specific monograph. *Purple Foxglove* has been chosen since, as seen later, there is a relevant reference to it in the first chapter of Dr Pereira's work. Digitalis had been introduced to medicine as early as 1785 by Dr William Withering; a considerable amount of research had been done on it and it was in regular use in the form of powdered leaf, and as an infusion, tincture

and extract of digitalis and mixed with squill in *Pilulae Digitalis et Scillae*.

An immediate observation is the considerable scope and detail of the monograph. The *Physiological Effects* and *Uses* cover almost eight pages[3]. In considering the physiological effects of foxglove he suggested three degrees of its operation; the first is that produced by small and repeated doses, mentioning all of the *symptoms* that it can produce. The use of the word *symptom* here is best explained by referring to a statement which appears early in his work[4], where he describes the means of ascertaining the operation of medicines by observation of their effects on man:

> In ascertaining the action of remedial agents on the *living* body, it is necessary that we examine their influence both in healthy and diseased conditions. For, by the first we learn the positive or actual power of a medicine over the body; while by the second, we see how that power is modified by the presence of disease.

Returning to the monograph, it was noted that foxglove's influence over the circulation was not at all constant; in some cases the frequency of the pulse was increased, in others decreased, in some unaffected, but in a considerable number of cases it became irregular or intermittent. The observations and opinions of various other doctors are discussed before the point is made that

> if it be desired to reduce the frequency of the pulse, the patient should be kept in the recumbent posture.

The physiology behind this statement is then explained in detail before

> I need scarcely add that the sudden change of position in those who are much under the influence of this medicine is attended with great danger, and in several instances has proved fatal; for, in consequence of the heart not having sufficient power to propel the blood to the head against gravity, fatal syncope has been the result.

Also mentioned under this heading, again with much discussion and references to other doctors' experiences, is its *cumulative effect*, its diuretic effect and the increased flow of saliva it may produce.

The second degree of operation of digitalis would be that associated with the use of too large or too long-continued doses. Again, there are detailed and lengthy descriptions of the *symptoms* produced, before proceeding to the consideration that 'the quantity of digitalis that may be given to a patient without destroying life, is much greater than is ordinarily imagined'. He quotes a number of instances, not only of his own observations and treatments but also those of others. The *usual* adult dose quoted for tincture of digitalis is 10 minims cautiously increasing to 40 minims and repeated every six hours. He cites his own experience of having seen

> twenty drops (minims) of the tincture given to an infant labouring under hydrocephalus, three times daily for a fortnight, at the end of which time the little patient was completely recovered, without one untoward symptom.

He states that he has frequently given a drachm (60 minims) three times daily, for a fortnight, without observing any marked effect. However, he reserves the highest dose quoted to a 'highly respectable practitioner' who has, for many years, been in the habit of administering the tincture

> to the extent of from half an ounce to an ounce (480 minims) at a time, not only with safety, but with the most decided advantage, as a remedy for acute inflammation, – not, however, to the exclusion of blood-letting, which, on the contrary, he previously uses with considerable freedom

(presumably indicating that this would concentrate the effect).

The third degree of operation is that resulting from *fatal doses*. All of the symptoms of poisoning by the drug are noted.

The next section deals with the uses of foxglove and indicates the four main purposes for which it is employed. These are: to reduce the frequency and force of the heart's action; to promote the action of the absorbents (absorbing vessels); as a diuretic; and 'sometimes on account of its specific influence over the cerebro-spinal system'. He lists seven diseases in which it is used, and adds an eighth *various* section. In all cases these are linked to the four main purposes listed, together with much discussion and reference to other authors. In its use in *fever*, for example, it reduces the frequency of the pulse (*sedative* action on the heart and circulation), but in relation to the other symptoms of *fever* it must be remembered that 'it is an agent which exercises a specific influence over the brain'. In the case of *inflammation* it is used, again, to reduce the frequency of the pulse. He notes the celebrity of foxglove as a remedy for *dropsy* and discusses its diuretic effect. He suggests it is 'oftentimes serviceable' in *hemorrhages* from internal organs, and covers its use in *diseases of the heart and great vessels* (*sedative* effect) in detail. Although quoting numerous works relating to 'supposed' cures for *phthisis* (tuberculosis), he considers it of little, or no, value. However, in cases of *insanity and epilepsy* it may prove serviceable 'by repressing excessive vascular excitement' but its specific cerebro-spinal effects must also be considered. He finally mentions *scrofula* and *asthma* and refers the reader to a further author for other diseases relieved by the drug.

The monograph is concluded by listing the available preparations of foxglove, together with details of how they are prepared and their *usual* doses, before considering possible antidotes. These are basically aimed at countering the symptoms of poisoning, since there is no known chemical that would be effective.

Thus, every effect that the drug had on the body was considered as part of its action. The major difficulty, for the researcher, with this 'all inclusive' method of acquiring knowledge, which was essential in forming a basic understanding of his subject, was the volume of it that was available from so many sources. Every detail would be investigated, and it is quite apparent that any reference to the modern concepts of 'side effects', 'adverse reactions' or, even 'overdoses' would be totally misplaced.

From the monograph, it would appear that a major action of digitalis is as a *sedative* due to its effect upon the

heart and circulation, but conversely, as a diuretic, it is also a *stimulant*, either by stimulating the action of the *absorbent vessels*, or by direct stimulation of the kidneys. It is also *stimulant* in its effect on the salivary glands in producing salivation. In addition to these two effects, there is also its direct effect upon the *cerebro-spinal system*. The *cerebro-spinants* appear as the first class of substances to be considered in the *Physiological Classes of Medicines* in the main work. In the grouping of medicines within this class the following appears[5]:

> The *seventh group* includes tobacco and foxglove, both of which are remarkable for their depressing influence on the circulating organs, in consequence of which they are denominated *sedatives*. When taken internally, in large doses, they give rise to nausea, vomiting, giddiness, feebleness and irregularity of pulse, fainting, convulsions and insensibility. Foxglove sometimes causes salivation. Both substances have been employed to reduce the frequency and force of the hearts action, and to cause diuresis.

Thus, foxglove belongs primarily to the class of *cerebro-spinants* and Dr Pereira denominates it a *sedative*. However, in working towards this conclusion, there would have been those who had concentrated on its *stimulant* action as a *diuretic* or *sialogogue*, or on its *antipyretic* properties, or on its use as an *antiphlogistant* in inflammation and, of course, there were still those who were convinced of its usefulness in *phthisis*. Considerable discussion and argument would have taken place in deciding what its *principal action* actually was, and it is feasible that the argument was still continuing.

It is hoped that taking the example of such a well known, well researched and frequently used drug and placing this in the context of the wide variety of drugs that were available, together with the fact that no-one knew how they actually worked, could explain the widely divergent opinions quoted in the *Preface* and would support his reluctance to use a classification based on the action and uses of drugs.

It can be seen from the foregoing that pharmacology was in its infancy. Dr Pereira was only one of a large group of researchers, internationally, who were restricted by lack of basic knowledge, but there is no doubting the intensity of their desire to acquire it.

Returning to the pharmacy student of the day, he would still have to be fully conversant with the doses and practical uses of the drugs that he would be required to sell, compound and dispense during his working life. This knowledge would be acquired, as it had been by those Chemists and Druggists who were organising the new Pharmaceutical Society in 1841, during a long and detailed apprenticeship followed, for most, by a lengthy period as an assistant. Irrespective of the actions of the new Society, there was no indication of any major changes to this arrangement in the foreseeable future.

It was Jacob Bell who first indicated that one of the major functions of the new Society would be the advancement of the art and science of pharmacy, and that if pharmacists concentrated on this they would have no need to encroach upon the practice of medicine. The basic science underlying the preparation of medicines and the purity of the finished product in pharmaceutics, and the specific nature of pharmaceutical chemistry would allow for the acquisition of accurate, factual knowledge and considerable opportunities for research. Similarly, as Dr Pereira indicated, if future pharmacists were to view the drugs they handled as items capable of providing opportunity for detailed knowledge and research, rather than considering them as simple articles of commerce, the wealth of information available in pharmacognosy and medical botany would be almost limitless.

In terms of *pharmacodynamics,* research was entirely medically orientated and the possibility of arguing for the inclusion of any part of the subject in pharmaceutical education would come under the critical scrutiny of the medical profession who were determined to maintain strict boundaries between pharmacy and medicine. This point is exemplified, later, by the removal of the word *toxicology*, in relation to pharmaceutical education, from the 1852 legislation[6], at the insistence of the apothecaries.

It was very important, politically, for the chemists and druggists to organise themselves into a recognised Society, that could represent their interests, as quickly as possible. This would involve details of their proposed aims, which would include future education. Considering the urgency of the situation and the forceful stance of the medical profession, it would, nonetheless, be unwise to argue that this was sufficient reason for the specific exclusion of *pharmacodynamics* or any subject fundamental to it, such as basic animal or human biology, from the formal education of those who were to be responsible for the compounding, selling and dispensing of medicines.

Conversely, the factual knowledge that was available to them in pharmaceutics, pharmaceutical chemistry, medical botany and 'pharmaceutical' materia medica, compared to the theoretical nature of *pharmacodynamics,* could see them become 'men of science' within their own sphere of pharmacy and would maintain the essential boundary with medicine. Their own knowledge of the apprenticeship style of education regarding the drugs they used, and the possibility of formal education expanding as pharmacy evolved, could have formed the basis for an argument that the inclusion of *pharmacodynamics* was not essential at that time.

This possible argument could be carried forward throughout the remainder of the 1800s since, in terms of day to day practice, there were no major changes for pharmacists and the majority of drugs available were still of little use. However, such an opinion does not overlook the immense volume of work, which would have such an important impact on pharmacology, undertaken during the middle and latter half of the century. The use of nitrous oxide, ether and, finally, chloroform as anaesthetics, the awareness of cleanliness combating disease (e.g. Florence Nightingale), John Snow tracing cholera to the street water pump in London, the contagious nature of puerperal fever being confirmed and, importantly, the work of Pasteur and Koch in the introduction of the germ theory, followed by the

introduction of antisepsis in surgery by Joseph Lister and the necessity of the Sanitary Act were all contributory. During the last decade of the century X-rays had been discovered, malaria had been shown to be transmitted by the *Anopheles* mosquito and in 1899 aspirin was introduced. By the turn of the century, Ehrlich had started his work in the field of chemotherapy.

Whether the above argument is valid, or the stance of the medical profession was the only obstacle or even if simple indifference was the major problem, a situation in which pharmacy students were not required to have a formal education in animal biology, human physiology or pharmacology could not be maintained as the medical advances of the 20th Century unfolded.

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References and Endnotes

1. Two Tiers of Materia Medica. *Pharmaceutical Historian* 2010; 40 (3): 46-49.
2. *Ibid.;* also From Unacceptable to Essential, *Pharmaceutical Historian* 2012; 42 (2): 40-43.
3. Pereira, Jonathan. *The Elements of Materia Medica*, part 2. London: Longman, Orme, Browne, Green and Longmans, 1840: 838-845.
4. *Ibid.* part 1, 1839: 7.
5. *Ibid.* part 1, 1839: 67.
6. Progress of the Pharmacy Bill. *Pharmaceutical Journal* 1852 (1 March); 11: 385.

Major Accessions to Repositories in 2012 Relating to Pharmacy

Ceredigion Archives, Old Town Hall, Queen's Square, Aberystwyth, Ceredigion SY23 2EB: J. Miall Jones, chemist, Aberystwyth: records (MUS/82)

Cheshire Archives and Local Studies, Cheshire Record Office,Duke Street, Chester CH1 1RL: Royal Pharmaceutical Society of Great Britain: Cheshire and District and South Cheshire branches: minutes and records 1939-2010 (D 8279)

Highland Archives, Lochaber Archive Centre,Lochaber College,An Aird, Fort William PH33 6AN: Macfarlane & Son, chemists, Fort William: cash books, poisons register, corresp, testimonials, newscuttings c1960-1999 (L/D115)

Aberdeen Medico-Chirurgical Society, Medical Centre, Foresterhill, Aberdeen, Aberdeenshire AB9 2ZD: Will Chemists (Inverurie) Ltd: pharmacy registers 1921-1952 (AMCS/4/11/17)

Wellcome Library, Archives and Manuscripts Section, 183 Euston Road, London NW1 2BE: Stephen Irwin Abrams, American scholar of parapsychology and drug policy activist: papers covering topics such as Extra-Sensory Perception, cannabis law reform and the work of the SOMA organisation, LSD and other psychedelics and alchemy c1950-2005 (PP/SAB).

Teaching Pharmacy in Malta '1676 – 1990s' Part II

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Setting the Scene

This second[21] article continues the review of the milestone developments in Maltese pharmacy education from 1674 to 1990s. The article also presents the analysis of the shifts in pharmaceutical education over the centuries. Chemistry and Practical Pharmacy were the subjects which were mostly emphasised over 300 years. Botany, and languages have been phased out, and subjects like Biochemistry and Pharmaceutics have found their place in the first year curricula. This might indicate that to keep abreast with progress made in pharmacy, the education of a pharmacist changed from a course which emphasised botany in 1676 to a course emphasising analytical chemistry, pharmaceutics and pharmacy practice, as today's modern pharmacy requires.

The teaching of pharmacy in Malta throughout the Twentieth Century

By 1921, the course of pharmacy was conducted over a period of three-years, on a triennial basis. It involved both theoretical and practical instruction, and, on successfully completing the course, candidates were awarded a Diploma in Pharmacy.[1] But a licence had to be issued before candidates could actually practise the profession. In order to obtain this licence a recommendation by the Medical Board was essential. In 1946 thirty-eight candidates who had obtained the Diploma in Pharmacy of the Royal University of Malta were recommended for the licence to practise the Pharmaceutical Profession.[2]

In 1936, candidates who wanted to enter the course of pharmacy had to be in possession of a pass in five subjects at matriculation level, which had to be obtained during the same examination session. The subjects required by the University allowing entrance to the course of pharmacy were: two of the following languages: English, Italian, Latin and French, and three of the following sciences: physics, chemistry, biology, and mathematics.[3]

The pharmacy course during the 1930s was integrated within the course of medicine,[4] and the Pharmacy Department was part of the Faculty of Medicine and Surgery. During the first three years, pharmacy and medicine students studied the same basic subjects. While throughout the first year English, Italian, botany, physics, zoology and inorganic chemistry, were all given importance. In the second year English, Italian, botany and materia medica were emphasised.[5] After 1936, physiology and bacteriology were added to the curriculum,[6] and during the third year, botany, materia medica and pharmacognosy were introduced. Throughout this period, professor Fogarty was the English Language lecturer, while professor Vella was the botany and zoology lecturer, and professor Borg was the physics lecturer. It is important to note that in the 1932-36 course,

pharmacology was not a part of the curriculum, with experiments being performed only in pharmacy practice,[7] and not in chemistry or pharmacognosy.[8]

Although the 1939 course was planned in the same manner as its predecessor, World War II broke out in the September of that year and the Chief Government Medical Officer ordered the pharmacy and medical students to discontinue their respective courses. Instead they had to take up nursing and all students were sent to St Aloysius College. Throughout the same period all University students were required to be trained as soldiers at Fort Ricasoli for three months, after which they were discharged.

At this time, pharmacy students were required to stipulate during the first year whether or not they would be continuing their studies in order to become general practitioners. This choice was made obligatory by the rector Professor Galea.

During the above mentioned nursing course the annual examinations were still held, and many students fared badly because the syllabuses were not covered properly. This resulted in a resit examination session being introduced. According to J Ellul (today a retired pharmacist, and one of the students in the 1939 pharmacy course), the subjects which were given great importance were: 'maths, English, materia medica (which was lectured by the Chief Medical Consultant Guzi Debono), botany, pharmacognosy and pharmacology'. Apart from the theoretical aspect of pharmacy, students in the 1939 course had to practise in a pharmacy for two years. The pharmacy they had to attend could have been either government or privately managed. But, unfortunately, the number of hours that students had to practice was not stipulated in any statute, and the system was abused. But at the end of the two years, the student was obliged to present a certificate relating to his performance and capabilities, signed by the managing pharmacist of the pharmacy.[9]

The first course to be opened after World War II was that of 1946. Once again it was planned in the same way as its predecessors. Apart from the fact that students could obtain a first Diploma in Pharmacy, and then continue to study for their MD degree, students were now given the opportunity to obtain a degree of Bachelor of Science (BSc). However, for students to avail themselves of this option, they were required to study chemistry and biology, as well as pharmacology, in the pharmacy course.[10]

The course which led to the Diploma of a Pharmaceutical Chemist (PhC), was finally abolished and replaced by the degree of Bachelor of Pharmacy (BPharm), in 1949. The course was now extended to cover a four-year period, with pharmacy practice extended over a two-year period at an approved pharmacy. Prior to this reform, the University Statute of 1943 had brought about important modifications in the curriculum, with more time devoted to the theory involved in Pharmacy. The period of practical training was reduced to one year. Following this, a provision requiring students to work at the pharmacy laboratory of the University for an average period of one-hundred-and-twenty hours, to the satisfaction of the Professor of *Materia Medica*, was implemented.[11]

In the mid-sixties a preliminary course of science was established in order to prepare students wishing to enter any science related course at the University, for the standard of tertiary education. Consequently, an opportunity arose for students who did not obtain one Advanced level and therefore did not satisfy the entry requirements of the University but were in possession of Ordinary levels in chemistry, physics, biology, and mathematics, to enter University after satisfactorily completing this course. Since the preliminary course provided students with a sound scientific basis of knowledge, it did away with the necessity of courses having to provide this at their introductory stage.

Prior to the introduction of this course, the educational system consisted of a series of matriculation classes that acted as preparation for students intending to enter University (these classes were attended for only a year). However, the science related classes ceased to be organised once the preliminary course of science was established. Towards the end of the 1960s, the preliminary course of science became the Part I course of the BSc curriculum.

This course was set in a flexible manner and certain extracurricular subjects were lectured to students wishing to take that subject as a major area in their academic training. Also if any student obtained an 'A' level in a science subject, he was exempted from the preliminary course of science, and could directly enter the first or second year of the academic course as required. Students who wished to enter the pharmacy course had to register for the preliminary course of science, and the following subjects were studied: mathematics, lectured by Professor Borg-Costanzi; physics, lectured by Dr B C Lewis; chemistry, lectured by Professor Farrugia and Professor Edwards; and biology. In the '60s regulations were laid down prohibiting students following the pharmacy course from continuing their studies to become general practitioners, or obtaining a bachelor of science degree. The entry requirements for the pharmacy and medicine courses were identical, and both opened biannually.

During the late '60s the pharmacy course was set over a two-year period. Lectures were carried out in a small room on the ground floor of the Evans laboratory in Valletta, while chemistry lectures were carried out in the proper laboratory in the second floor of the same building. The number of students was usually around fifteen, and most foreign lecturers were amazed at this large number attending the pharmacy course.[12] During the late sixties (1967-8) students in the first year of the pharmacy course had to study: pharmaceutical chemistry, pharmacognosy (lectured by Dr C De Luca) and pharmaceutics. During their second year, students studied: pharmaceutics, pharmacology (lectured by Dr Lanfranco), and pharmacognosy. All these lectures were supplemented by practicals. Practicals of pharmaceutics included the dispensing of medicinals.

Pharmaceutical chemistry studied in those days consisted of organic and analytical chemistry (examples

included: UV spectroscopy, and gas chromatography) supplemented by examples relative to pharmacy, such as: alkaloids, quinidine, salicylic acid and other heterocyclic drugs. In pharmacognosy, students had to study medicinal plants, both in theory and in practice by carrying out experiments such as staining procedures, and observing plants under the microscope.

Professor Borg-Costanzi was the University Rector in 1968, and it has been said that he never had a very high opinion of the pharmacy course, or of pharmacy in general. Instead, his favourite course was the BSc course which he had introduced during the sixties, and during those years he always did his utmost to increase the popularity of the BSc course. However, during the late sixties at the Academia Maltese (commonly known as the 'Polytechnic'), courses were starting to be delivered in chemistry and other science related subjects. Unfortunately, Professor Borg-Costanzi became obsessed with the idea of transferring the pharmacy course to the 'Polytechnic' as it was his opinion that the pharmacy course should not form part of the Faculty of Medicine and Surgery, but rather should be reinstituted at the 'Polytechnic' as a course leading to a certificate. This turn of affairs, was not greeted well by pharmacy students and a campaign was started by students, along with the Malta Union of Pharmacists (whose president was Mr A Darmenia), and the Chamber of Pharmacists (whose president was Mr W Felice) in order to increase public awareness of the importance of the role of the pharmacist in society. Prior to the start of this campaign, a number of very important meetings were held to discuss the situation and evaluate the methods with which the situation could be resolved. Taking part in these meetings was Mr Norman Formosa (who used to attend congresses held by the FIP abroad). Through his and Mr Darmenia's connections, professor Douglas Whittet (the English Chief Pharmacist in the 1960s) was brought over to Malta. Mr Emanuel Bezzina (a member of parliament) also helped out.

A 'Pharmacy Week' exhibition was organised, and one of the exhibitions was held in the MITP building at the old University in Valletta. During this exhibition, students carried out chemistry experiments, and extemporaneously prepared different pharmaceutical dosage forms (tablets, sterile ampoules, etc) to show a few jobs that can be carried out by pharmacists.

At the end of this 'pharmacy week', a dinner (which was attended by the Rector) was organised. During this dinner, determinant speeches were made by Mr W Felice, and Dr Whittet. Naturally, Dr Whittet's presence on the island must have impressed the Rector. It must also be added that the Commonwealth's University Association, which was very influential regarding innovations at the University of Malta (by providing financial aid in the form of scholarships), was embarking on a 'mission' to make Universities improve the standard of their pharmacy course. These factors together made the Rector change his mind, and instead he embarked on a totally different project, one of which involved the improvement of the existing pharmacy course by sending graduates abroad for further study at the University of London.[13] The Rector's aim in such a manoeuvre was meant to ensure that, after this period of training, the graduate would become Head of the Pharmacy Department, but due to political reasons this did not occur, and Dr Jaccarini became the acting Head of the Pharmacy Department in the early 1970s.[14]

Between 1970 and 1977 the pharmacy course was modelled on the traditional three-year British type of course. The minimum requirements needed to enter the course were two 'C' grades and one 'D' grade at Advanced level in chemistry, biology and physics. The course was based on four main pharmaceutical sciences: pharmaceutical chemistry, pharmacology, pharmaceutics, and pharmacognosy. Only a small percentage of the curriculum was taken up by the actual practice of pharmacy, which consisted of traditional operations such as compounding technology, posology, prescription calculations, and pharmacoeconomics (the latter was of particular importance at this time due to the growing concern about the rise in drug costs). No aspect of pharmacy administration was introduced in the curriculum and so matters which would have increased the efficacy of drug therapy were left undealt with. Socio-medical topics such as sociology of medicine and pharmacy as a profession were not included in the curriculum.[15]

In 1977 the Maltese government introduced the Student Worker Scheme. Students were required to work for six months of the year, and to attend lectures for the remaining six months. Students, already exempted from paying for their tuition fees at the University, could now benefit from an annually increasing remuneration donated by a sponsor. The aim of such a scheme was to provide a means by which the demand and supply of professional manpower needs of the country could be met.

The 1976-1979 course of pharmacy was adapted to fit the new course structure, and students were divided into two groups, each alternating between the work and study semesters. The government acted as sponsor.[16] In 1981, a discussion paper was presented to the government by Dr Alfred Sant, who chaired a Committee[17] set up to advise on the possibilities of restructuring the BPharm degree course within the student worker scheme for tertiary education.

The Committee proposed the following structure for the BPharm course:

> The course should be set into two sections; a **Foundation course**, lasting one year and should cover mathematical methods, chemistry, biology and physics; and an **Orientation course** lasting three years, which would be streamed into two overlapping categories pharmacy and technology. The pharmacy option would cover: pharmaceutical chemistry; physiology and biochemistry; pharmaceutics I and II; pharmacology, and pharmacognosy. The technology option would cover: pharmaceutical and industrial chemistry; process technology; physiology and biochemistry; pharmaceutics I and industrial biology.[18]

On 17 January 1988, the Chamber of Pharmacists organised a seminar entitled 'Pharmacy Education in Malta'. One major issue discussed that day was the Curriculum of the BPharm degree. The question of the relevancy of the pharmacy course to the needs of society was kept in mind throughout the discussions, and the pharmacist was evidenced to have a distinctive role and

was deemed indispensable for his/her contribution towards health care. Consequently, the notion that pharmacy education should be a process that introduces theory by demonstrating its practical relevance, was maintained throughout the discussions, and a number of important conclusions and recommendations pertaining to the pharmacy degree curriculum were reached. The final workshop recommendations were as follows:

The course must be based on the following three divisions:-

a. *Pharmaceutical sciences*
   - i. Pharmaceutical Chemistry and Analytical Chemistry
   - ii. Synthetic and Natural products
   - iii. Pharmaceutics

b. *Pharmacy practice and psychosocial pharmacy*
   - i. Pharmacy Practice
   - ii. Managerial sciences
   - iii. Psychosocial and legislative aspects of pharmacy

c. *Clinical pharmacy and biopharmaceutics*
   - i. Pharmacology
   - ii. Clinical Pharmacy
   - iii. Physiology and Biochemistry
   - iv. Biopharmaceutics and Pharmacokinetics
   - v. Disease.[19]

To date, although most of the above recommendations have been implemented, the 1994-1998 pharmacy course was felt to be lacking in communication and personal skills, especially in the psychosocial sciences. Furthermore, no lectures on the different types of research methods relevant to undergraduates have been introduced yet. The advantages of such studies would lie not in their theoretical aspect, but in the practical hints they would provide students with, helping them to achieve the set objectives of the projects being carried out (whether chemical, analytical, social, closed-ended versus open-ended formal or informal interviews, and questionnaires).

Another point worth mentioning regarding pharmacy education is that since 1988, the Pharmacy Department of the University of Malta has been organising symposia on research carried out by both undergraduate and postgraduate students (cf. Appendix XII). Also, since 1981, continuing education lectures have been organised by the Chamber of Pharmacists. These lectures have covered topics ranging from novel pharmaceutical developments to pharmacokinetics, and pharmacy practice. It is of note that in 1987 the student worker scheme was discontinued and students pursued their studies without any interruption. To compensate for loss of wages, the government of the day introduced the payment of stipends to full-time students.

Trends in pharmacy education.

Since the establishment of the School of Anatomy and Surgery in 1676, it has been observed that it was necessary to increase the duration of the pharmacy course. However, documentation available shows that the pharmacy course had been set over two years for 224 years.

At the beginning of the twentieth century the pharmacy course was modified to a three-year course, and remained so till the 1980s, when it was extended to cover a four-year period (cf. Table 1). In 1995, the addition of another year extended the undergraduate course of pharmacy to a five-year duration.

The need to increase the duration of the pharmacy course may be explained by the fact that, with the increase in the information and the progress witnessed in the pharmaceutical and medical professions, the modern pharmacist came to require a sound basic knowledge in a wide spectrum of subjects which were becoming increasingly essential to his expanding role. Consequently, it became a physical impossibility to achieve the increasingly demanding objectives of pharmacy studies within the time limits of the original pharmacy course.

Duration of Course	17th C	19th C	1900-79	1980s-1994
2 years	✓	✓		
3 years			✓	
4 years				✓

Table 1. Duration of the pharmacy course throughout the Seventeenth, Nineteenth and Twentieth Centuries.

Various modifications have occurred within the pharmacy curriculum since 1676. The subjects studied during the respective pharmacy courses during the seventeenth, nineteenth, and twentieth centuries have been presented in Table 2.

The data show that botany was a core subject for more than two-hundred-and-fifty years (as it had repeatedly been included in the curriculum throughout the first-, second- and third-year courses). It twas hen phased out of the pharmacy course during the late 1940s, as a probable result of the decreased utilisation of crude drugs by the community pharmacist in extemporaneously preparing medicaments.

Materia medica has also been phased out of the curriculum since the mid-1930s. Documentation available indicates that materia medica had been introduced into the pharmacy course by 1676. Although this subject was important, it was dropped out of the first-year courses as from 1838. However, it was an integral subject throughout the second-year courses in the nineteenth century.

Materia medica consisted of lectures on the formulation and uses of active ingredients (usually obtained in the form of crude drugs). So, materia medica can be said to have contained topics today studied in industrial pharmacy (like dosage formulation), pharmacology (the side effects of drugs) and pharmacognosy (the extraction of crude drugs).

According to the documentation available, Natural History has never been a core subject in the pharmacy curriculum. In fact, it is only documented to have been included in the pharmacy first-year curriculum in 1838, and was removed by 1887. English and Italian were included in the pharmacy curriculum from 1887 until the late 1940s. However, they never formed part of the second-, third- and fourth-year curricula. Latin, Physics and Mathematics, on the other hand, were only included in the first-year curriculum throughout the 1930s and '40s. All these subjects were introduced to provide a sound basis for other subjects studied at a tertiary level of education.

Table 2. Subjects studied during Pharmacy courses.*[19]

Period	17th C	19th C		20th C			
Subjects	**1st year**	**1st year**	**2nd year**	**1st year**	**2nd year**	**3rd year**	**4th year**
Botany	✓	✓	✓	✓	✓	✓	
Materia Medica	✓	✓	✓				
Natural History		✓					
English		✓		✓			
Italian		✓		✓			
Latin				✓			
Physics				✓			
Maths				✓			
Practical Pharmacy (Extemporaneous Preparations)	✓	✓	✓	✓	✓	✓	✓
Practical Chemistry		✓			✓	✓	✓
Pharmaceutical Chemistry	✓	✓	✓	✓	✓	✓	✓
Organic Chemistry		✓		✓	✓		✓
Analytical Chemistry				✓	✓	✓	✓
Anatomy				✓			
Physiology and Biochemistry				✓	✓		
Mathematical Methods				✓			
Pharmacognosy				✓	✓	✓	
Pharmacy Practice				✓	✓	✓	✓
Microbiology				✓	✓	✓	✓
Pharmacology					✓	✓	✓
Pharmaceutics				✓	✓	✓	✓

The information available regarding Practical Pharmacy (extemporaneous preparations) indicates that this subject has been given special importance throughout the centuries, and although it is documented that it did not form part of the curriculum during most of the nineteenth century, it found its place in the curriculum once again in 1889. Throughout the seventeenth century, practical pharmacy (extemporaneous preparations) was performed in the dispensary of the Holy Infirmary (see Part I),[21] but from 1889 to date, practical pharmacy has been performed in the laboratories of the University of Malta. Apart from the preparation of extemporaneous dosage formulations, pharmacy students since 1889, have been asked to attend a community pharmacy, and during the 1930s and '40s students also had to obtain a certificate signed by the Managing Apothecary of the community pharmacy being attended by the student. Unfortunately, lack of documentation cannot elucidate if this latter practice was maintained throughout the 1950s, '60s and '70s. It was reintroduced in the 1990s.

According to the documents consulted, it can be seen that chemistry and its respective disciplines (like organic and analytical chemistry) had been included in the first-year pharmacy course from 1676 to 1995, and in the second- and third-year courses since 1835. This indicates that chemistry has always been considered a fundamental core subject in pharmaceutical education, and it is the basis upon which a holistic understanding of drugs depends.

However, subjects like Anatomy, Mathematical Methods, Physiology and Biochemistry, have only lately been introduced into the first-year pharmacy course. In fact, Biochemistry and Physiology were introduced into the curriculum in the late 1940s, and Anatomy and Mathematical Methods in the 1970s. To date, documentation shows that these subjects have become integral parts of the first-year curricula, with only Physiology and Biochemistry included in the second-year course. The reason why these subjects have acquired so much importance, is that they are basic to the understanding of other core subjects emphasised to date, such as Pharmacology and Pharmacokinetics.

Data available show also that Pharmacognosy was introduced in the curriculum during the 1970s. However, although it was given importance throughout the first- and second-year course in the 1970s, it has today found its mainstay as a core subject in the third-year curriculum. Pharmaceutics (including Microbiology) is documented to

have been part of the curriculum since the 1970s and is nowadays considered a core subject.

Pharmacology (including Pharmacokinetics) is another core subject, forming part of the second-, third- and fourth-year curricula. It was introduced only in the late 1970s. General Pathology and Behavioural Sciences, on the other hand, have only recently found their place in the second-year curricula.

Conclusion

A fairly clear picture has emerged regarding the changes that occurred within the Maltese pharmacy course over the centuries. However, no documentation has been located that attests to the level of education attained in the respective subjects from 1676 to 1920. For example, it is known that the chemistry studied throughout the first quarter of the nineteenth century was mainly inorganic and organic, but no evidence of the study of mechanisms of reactions has been found. Although no direct evidence was found to answer this question, the author postulates that the standard must have been very high, as Professor J Borg's extremely detailed book *Descriptive Flora of the Maltese Islands in 1927*[20] was used by many students studying Botany at University.

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Endnotes and References

1. Cassar, P. *Medical History of Malta*. London: Wellcome Historical Medical Library, 1964: 490-9.

2. *Report on the Health Conditions of the Maltese Islands,* 1946: LXXVII.

3. Ellul, J. Retired Pharmacist: Personal Communication 16 August 1997, Malta, and Deguara, J, Managing Pharmacist: Victory Pharmacy, Victory Square, Naxxar, Malta: Personal Communication 28 November 1996, Malta.

4. Deguara, J. Reference 3.

5. Farrugia, G, Optician: Muscat's Opticians, Republic Str., Valletta, Malta: Personal Communication 22 August 1997, Malta.

6. Deguara, J. Reference 3.

7. The experiments referred to were really practicals in the extemporaneous preparation of medicaments, such as pills, ointments, and tinctures.

8. Farrugia, G. Reference 5.

9. Ellul, J. Reference 3.

10. Aquilina, A, Retired Pharmacist: Personal Communication 4 September 1996, Malta.

11. Cassar, P. Reference 1.

12. The total number of students in the 1968 pharmacy course was sixteen. These were: Imelda Cachia, Maurice Zarb Adami (today senior lecturer at the Pharmacy Department in the University of Malta), Tony Nicholl, Tony Muscat, Reno Schembri-Wismayer, Alfred Mangion, Joseph Mifsud, Nina Rizzo, Marleen Mahony (today Portugese), Professor Anthony Serracino-Inglott (today Head of the Pharmacy Department at the University of Malta), Dr Rena Balzan (Geneticist, and lecturer at the University of Malta), Adelina Scriha, Claire Cachia, A and L Prince and Quentina Barbara.

13. Dr M Zarb Adami PhD was sent to London to read Pharmacy once again at the University of London.

14. Serracino-Inglott, A., Head of the Pharmacy Department: University of Malta, Msida, Malta: Personal Communication 6 January 1998, Malta.

15. Mintoff, L., An evaluation of the role of the pharmacist in Health Services in Malta [Thesis]. Msida, Malta: Department of Pharmacy, University of Malta, 1979. 400 pp.

16. Reference 15: 109-110.

17. The committee set up to advise on the restructuring of the BPharm degree course was composed of the following: Dr A Sant, chairman; Hon. J Sciberras, representative of the Ministry of Education; Ms L Mintoff, representative of the Ministry of Health; Mr A Scicluna-Spiteri, representative of the University; Mr R Fava, representative of the Malta Chamber of Pharmacists; Mr T Vella, representative of the Federation of Industries; Mr P Ebejer, secretary.

18. Sant, A. *The Restructuring of The Pharmacy Degree Course: A Report to the Minister of Education: Malta-1981.* Malta: The Ministry of Education and The Commission for the Development of Higher Education, Government Printing Press, 1981: 6.

19. Chamber of Pharmacists. Pharmacy Education in Malta Seminar, January 17th, 1988 (Federation of Professional Bodies, Paceville). *The Pharmacist* 1988; April (Supplement): v-xi.

19. *Compiled from: Cassar, P. Reference 1: 490-9; Gulia, G. Cenni Storici dell istruzione *Superiore principalmente della scuola Medica nei tempi dell Ordine*, Malta, 1886: 6-9; *Archives of the University of Malta.* No. 11, (1833-1838), 4v. University of Malta; *Statute of the University Of Malta.* Malta: Malta Government Printing Office, 1835: 35; University of Malta. *Statute of the University Of Malta.* Malta: Malta Government Printing Office, 1887: 32; University of Malta. *Statute of the University Of Malta.* Malta: Malta Government Printing Office, 1898: 34; Farrugia, G, Optician: Muscat's Opticians, Republic Str., Valletta, Malta: *Personal Communication* 22 August 1997, Malta; Ellul, J, Retired Pharmacist: *Personal Communication* 16 August 1997, Malta; Mintoff, L. *An evaluation of the role of the pharmacist in Health Services in Malta* [Thesis]. Malta: Department of Pharmacy, University of Malta, 1979: 100-300; *Degree of Bachelor of Pharmacy Curriculum* Year I (1994-1998). Malta: Department of Pharmacy, University of Malta, 1994: 10-9; *Degree of Bachelor of Pharmacy Curriculum* Year II (1994-1998). Malta: Department of Pharmacy, University of Malta, 1995: 30; *Degree of Bachelor of Pharmacy Curriculum* Year III (1994-1998). Malta: Department of Pharmacy, University of Malta, 1996: 5-30.

20. Borg, J. *Descriptive Flora of the Maltese Islands.* Malta: Government Press, 1927: 389.

21. Borg JJ. Teaching Pharmacy in Malta, Part 1. *Pharmaceutical Historian* 2014; June (3): 24-26.

The Pitcher Plant: a 'traditional' remedy?

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'*The plant in any situation is a very great curiosity.*'[1]

Introduction

(i) Newfoundland's introduction of the decimal currency 150 years ago occasioned the island's first one-cent coin featuring a wreath of the pitcher plant and oak leaves; (ii) *Sarracenia purpurea*, abundant in the bogs of Newfoundland and Labrador, became the provincial floral emblem in 1954; (iii) the plant has been described as 'symbolic of all that Newfoundlanders are'; and is the title of the newsletter of the Newfoundland Wildflower Society; (iv) a recent flurry of emails requesting signatures for the British Save Our Herbal Medicine campaign.

A sesquicentennial, current herbal practices, and Newfoundland pride prompted this critical appraisal that develops brief notes on the insectivorous *Sarracenia purpurea* published in the early 1990s.[3] While 'pitcher plant' is the best known common name, it applies to all *Sarracenia* species as do a host of others, for instance, huntsman's cup, Eve's cup, side-saddle plant, trumpet cup and flytrap that fascinate sleuths of the origins of common names.

In a 2008 *Pharmaceutical Historian* article, 'Traditional Use' Claims for Herbs: The Need for Competent Historical Research,' I questioned (i) the limited time span of usage accepted by jurisdictions to justify a label of 'traditionally used' (eg, 30 years under EU regulations, and 'two generations' in Canada), and (ii) the limited number of references, at least two in Canada, to justify a claim.[4] I also stressed the importance of appraising a range of primary sources to find patterns of evidence sufficient to move beyond anecdote to what can be described as collective *anecdotal knowledge*.

This account looks at the therapeutic claims for *Sarracenias*, indigenous to North America mostly to the East, as follows: (i) current and recent, (ii) from the seventeenth century to around 1850, (iii) from then until the early 1900s, (iv) and, lastly, summary and comments. The long time span raises questions on what is required to fulfil one definition of 'traditionally used,' namely that it be

> based on the sum total of knowledge, skills, and practices based on theories, beliefs, and experiences indigenous to a specific culture, used in the maintenance of health, as well as prevention, diagnosis, improvement, or treatment of physical and mental illness.[5]

Current and recent references

Among widely-used 'authoritative' websites, the *Natural Medicines Comprehensive Database* (consumer version) – the oft-consulted *PDR [Physicians' Desk Reference] for Herbal Medicines* is a key reference – states that *S. purpurea* (no reference to other species) is used [orally] for digestive disorders, particularly constipation, urinary tract diseases, as a diuretic, a cure for smallpox, and to prevent scar formation.[6] WebMD and the Dartmouth-Hitchcock Norris Cotton Cancer Center websites are two to repeat essentially the same information.[7]

Figure 1. *Sarracenia purpurea* L. subsp. *purpurea*[2]

Readers who mistrust conventional medicine's negativity toward herbal medicine might well overlook such cautionary comments in the entries as 'unproven', 'obsolete' or 'lack of credible supporting evidence', all the more so on reading the present tense ('*is* used') as current information. Moreover, encouraging claims about *Sarracenia*'s medicinal value are readily found. For example, as an antiviral based on a series of case histories and bolstered by reference to a 2012 scientific paper, 'In Vitro Characterization of a Nineteenth-Century Therapy for Smallpox', which in turn supported its laboratory findings using monkey-pox virus by citing only positive, not negative, nineteenth-century reports (see below) on *Sarracenia* therapy for smallpox.[8]

Aside from the Internet, innumerable books since the 1960s cater to popular interest in herbal medicine. However, only a few notice *Sarracenia*, mostly as a stimulant to 'appetite and digestion', with an occasional nod to the earlier reputation for smallpox without implying current usefulness.[9] Although this hints at little interest in Sarracenia, *Mrs Grieve's Modern Herbal* deserves special mention. Although first published in 1931, it joined the popular herbal books of recent decades through a 1971 reprint and a Web version. It has been viewed as authoritative even though the information on therapeutics mostly lacks evidence of first-hand experience. She wrote somewhat positively that the principal value of *S. purpurea* 'appears to be in torpid liver, stomach, kidney and uterus complaints', and that it had been introduced as a specific for smallpox by 'North American Indians with great success, saving life and even the unsightly pitting'. She was presumably referring only to smallpox when adding 'some homeopaths confirm the value of the remedy, but that allopaths do not appear to be successful'.[10]

Leaving aside popular books, always to be evaluated for slavish copying, the oral record can also establish 'traditional' usage. Caution is again needed. It cannot be assumed that the following statements apply to every medical use recorded at one time or another with regards to specific groups in society:

A sparse record reflects loss of information rather than loss of use

or

Given the stubbornly conservative value of folk culture, it is expected that a significant element of continuity will be present concerning uses of medicinal plants.[11]

Reports can fail to differentiate between, an informant's recollections of, say, a 'Grandmother's remedy' and on-going usage. Moreover, they can be frustratingly inconsistent. In South Carolina a decoction of *S. minor* was said to be in 'current use' in the 1960-70s applied 'warm on skin rash or eruptions', but the plant did not feature in a compilation published a few years later.[12]

Caution also applies to interpreting aboriginal information, even if sometimes, as with *Sarracenia*, traditional use might seem relatively strong.[13] Of special interest is knowledge among the Mi'kmaq people of Nova Scotia because they used it for smallpox in the 1860s (see below). A 1993 account of Mi'kmaq remedies noted that the water trapped in the 'trumpet' of *S. purpurea* was a magic elixir, and that the plant had been used to treat tuberculosis, kidney ailments, and indigestion.[14] However, these are *recollections* (not necessarily current usage) though at least a persistent thread of Mi'kmaq interest is reflected in oral testimony (2013) of chewing the dried root to treat a sore throat, in line with its long recognised astringency.[15]

1600s to c. 1850

While the sensory properties of astringent plants like *Sarracenia* once rationalised most uses, the spottiness of the pre-1850 *Sarracenia* story offers no indication of a generally known medical reputation. While, for instance, both the majestic and influential herbals of John Gerard (1633) and John Parkinson (1640) reproduced Carolus Clusius's 1601 illustration (identifiable as a *Sarracenia*, likely *purpurea*) under the name 'Hollow leaved Sea Lavender' (Figure 2), they recognised it as a novelty. Indeed, Gerard said he included it to encourage others to find it and investigate its properties. Strikingly, however, both authors grouped the plant with others that were 'astringent or binding' to be used for the 'collicke, strangurie, and Dysentaria' (Gerarde) and for 'the stomacke, the spitting of blood likewise, and the abundance of womens courses' (Parkinson) – all akin to later recommendations for *Sarracenia* spp.[16] Not long afterwards, John Josselyn in his *New England Rarities* (1674),[17] in a relatively clear reference to *S. purpurea* as 'Hollow Leaved Lavender', opined: 'I wonder where the knowledge of this plant hath slept all this while.' Since he included it under 'Burns and Scalds' one can surmise that Josselyn recognised the astringent properties, hence a suggestion that it was also useful for 'fluxes.'

The unusual botanical features of *Sarracenia* (a great 'curiosity') attracted many naturalists/botanists. In providing probably the first *detailed* botanical description, supported by specimens sent from Quebec to French botanists, physician Michel Sarrazin (1659-1734) was honoured in the genus name. Sarrazin's description included no medical information, only noting the pungency of the plant.[18] Yet a recent tantalising account attributes him as having successfully confirmed native

Figure 2. Clusius' illustration reproduced in Gerard's *Herball*.

Indian usage of the plant as an effective treatment for smallpox. Unfortunately, the claim is not supported by the author's documentation.[19]

If the smallpox treatment had become generally known during the 1700s, it is surprising, given the considerable interest in aboriginal knowledge at the time and the many outbreaks of the dreaded disease, that travellers/ naturalists who were likely to have heard about it omitted it from their publications, as did major reference works. Examples include Mark Catesby, Peter Kalm (who was well aware of Sarrazin's reputation), and William Bartram.[20] Clearly, neither *Sarracenia*'s carnivorous nature nor horticultural enthusiasm over potting the plants aroused general interest in medicinal properties. Even during the first half of the 1800s only an occasional medical reference has been found, for instance, *S. purpurea* as a strong decoction of the root used by the 'Red Indians' (Mi'kmaq) of Newfoundland to treat spitting of blood and other pulmonary complaints; no analogous reference appeared in medical botany texts or in the annotations in well-known floras.[21] In view of the later availability of *Sarracenia*, factors such as limited habitats (bogs and marshlands), naturalisation failures in Western Europe, and better known and well-established astringent/bitter alternatives only played a small part in this lack of interest, though maybe they explain the failure to circulate such *Sarracenia* titbits as placing a pitcher on a fire to boil the water trapped inside.[22]

1850s to early 1900s

The *Sarracenia* story changed dramatically during the 1850s to '60s, a time of constant exploration, both local and overseas, for new remedies. The spotlight began with an 1849 paper by FP Porcher on the medical use of *S. flava* and *S. variolaris* for dyspepsia, though he reached a much wider readership with his 1863 *Resources of the Southern Fields and Forests*, a book that, in serving the South during the American civil war, became widely quoted for many years.[23]

In both publications Porcher was at pains to stress that claims to relieve symptoms of dyspepsia came from many informants, including physicians, in whom he had 'the highest confidence'. Thus he offered a sense of collective anecdotal knowledge. He also supported the claims by reference to the 'astringent, bitter, tonic properties' and by suggesting the plant restored balance in stomach acidity.

Although these claims were also later attached indiscriminately to *S. purpurea,* this species gained the headlines in the early 1860s as a smallpox treatment. Initially, two physicians in Nova Scotia indicated that it was an infallible remedy used by local 'Indians'. One claimed that, after his trials, he became 'convinced of its astonishing efficacy'.[24] Another physician, promoting it in the august pages of *The Times* (1863), reported on eleven successful cases among troops stationed in Windsor. 'This remedy I consider a boon to the public'.[25]

This was soon challenged and the intense controversy that ensued during the 1860s was set against a backcloth of a growing questioning of the value of individual clinical observations, even small series of cases. Coupled with this was concern over premature public announcements. The *British Medical Journal*, for instance, responded harshly to *The Times* report:[26]

> An honourable member of the profession, contrary to all medical logic and sane medical observation, drew violent conclusions from antecedents which in no kind of way justified them, and then rushed into the public prints, exciting and inflating the anticipations of the public, and causing thereby serious annoyance to the profession as well as eventual grievous disappointment to the expectant public.

Conventional medical follow-up

The controversy soon lost steam on both sides of the Atlantic, but lingered on against a background of anti-vaccination movements and a search for new treatments. Medical textbooks, even American, on materia medica and therapeutics – intended primarily for medical students and young physicians – if not ignoring the plant, noticed smallpox only occasionally, while reporting briefly on tonic properties, especially for dyspepsia (though it fared poorly amid the intense competition from other such preparations).

On the other hand, reference books such as Dispensatories and medical dictionaries, if not druggists' formularies and handbooks, at least noted it if only as a footnote to the medical armamentarium. Sometimes this demanded updating.[27] For instance, Remington's 1918 edition of the *Dispensatory of the United States of America*, aside from listing constituents, only included, without follow-up, seventy-year-old information on therapeutic uses:[28]

> According to F. P. Porcher, the roots of *Sarracenia flava* L., and *S. variolaris* Michx., have long been used in the Southern United States in *dyspepsia*, and are tonic, laxative, and diuretic.

Earlier reference works at times joined criticism of the positive verdicts on *Sarracenia* and smallpox. The 1868 edition of Wood and Bache's *Dispensatory of the United States of America* reported:[29]

> We have no hesitation in expressing our conviction that the apparent efficacy of the remedy was simply owing to its employment in the cases of modified small-pox ... either through vaccination or a previous attack.

And the 1879 *National Dispensatory*, a successful competitor to Wood and Bache, offered a prophetic comment. After noting that positive smallpox treatments were not confirmed by experience, he added that, 'like other errors, it required some time and labor to destroy.'[30] (The author would have been interested to read a letter in an 1891 Newfoundland newspaper that still cited the above *Times* article as positive evidence of the value of aboriginal knowledge.)[31]

Physicians during the last half of the century could also turn to medical botany texts though these, too, generally offered cursory and inconsistent information on therapeutics, as did the offspring pharmacognosy texts. For example, L Johnson's *Manual of Medical Botany of North America* when quoting Porcher's report on *S. flava* and *variolaris* added *S. purpurea* as also possessing the properties of a bitter tonic and stomachic for 'dyspeptic conditions'.[32] He ignored smallpox, while Robert Bentley, in his 1882 *A Manual of Botany*, felt it necessary to again stress that 'extensive trials in the hospital in this and other countries' found the rhizome, rootlets and leaves of *S. purpurea* to be 'entirely useless'.[33]

Home medicine books at the time, written by 'MDs' and generally reflecting conventional medicine, also failed to offer a consistent message. Indeed, one of the few to mention *S. purpurea* offered therapeutic uses – St Vitus's dance, convulsions, tremors, nervous affections – out of line with those commonly listed.[34]

An alternative life

If medical texts, a mirror of basic medical education, were essentially dismissive of *Sarracenias*, at least *purpurea* had another life through two schools of medical thought, homoeopathy and, notably in the USA, Eclectic practice. During their heyday until the early twentieth century, both schools, which attracted many physicians initially trained in conventional medicine, had a mission to reform medicine.

Homoeopathy in the 1860s added fuel to the smallpox controversy. Although in 1864 and 1867 Edwin Hale, one of its pioneers, acknowledged that *Sarracenia* was not quite the sovereign smallpox remedy as claimed, he promoted further investigation by republishing positive smallpox results from conventional practitioners along with favourable homoeopathic evidence.[35] The same, somewhat confusing, mix of positive homoeopathic and conventional experiences appeared elsewhere, as in Millspaugh's *Sarracenia* monograph of 1887 helping to establish firmly the plant as a homoeopathic remedy.[36] Given homoeopathy's reliance on provings, often historical, and their theoretical underpinnings, it is unsurprising that *purpurea* remains in the homoeopathic armamentarium with some preparations currently accepted by regulatory jurisdictions.[37]

Eclectic practitioners (the name reflected their eclectic use of therapies) had a strong disposition toward botanical remedies, especially those native to North America. It is thus telling that *Sarracenia*, while a recognised remedy, never became well-established in Eclectic practice. Finley Ellingwood in his *American Materia Medica, Therapeutics*

and Pharmacognosy (1915) stated that *purpurea* has 'as yet, no established place in therapeutics'.[38] It was omitted from other key Eclectic texts and met ambivalence in others.[39] Its reputation for smallpox, however, did not die. When Ellingwood added that *Sarracenia* had been used with good results for 'zymotic disease' – eg, scarlet fever and measles as well as smallpox to modify their character, shorten their course and prevent sequelae – he repeated extrapolations to other contagious diseases initially raised in one of the first promotions for smallpox.[40]

Ellingwood was also repeating information on a label for a commercially manufactured *Sarracenia* 'Specific Medicine', a type of medicine discussed below (Figure 3).[41] It was marketed primarily to Eclectic practitioners and 'said to powerfully antidote the poison of contagious diseases – smallpox, lepra, measles, &c'.

While the literature suggests that demand for *Sarracenia* was never high, even among homoeopaths and Eclectics, various pharmaceutical companies included it their catalogues, maybe acquiring the raw material from influential Shaker herb businesses. Sharpe & Dohme in Baltimore were doing so by 1870 when they listed a fluid extract of *purpurea* with the remark: 'considered useful in the treatment of smallpox'.[42] Proprietary preparations were another aspect of the medical market place. A successful one, Aimar's Sarracenia or Fly Trap Bitters, was sold by Charleston druggist, GW Aimar, who was likely influenced by the Charleston 'Sarracenia authority', physician Frederick Porcher. After Aimar invited physicians in 1858 to give his preparation a trial, it survived well into the 1900s ostensibly for 'Dyspepsia or Indigestion, Nervous Weakness, Costiveness, General Debility, &c.' (Figures 4a & 4b).[43]

Closing comments

Even though Sarracenia has not been licensed as 'traditionally used' by any jurisdiction, the discordant and disjointed trail of information, not uncommon for many better established botanicals, raises general issues to be considered when evaluating traditional claims.

All ten references on Health Canada's 'partial list of recommended references to support traditional use claims' are used in this article unless they made no mention of *Sarracenia*.[44] It is noteworthy that half of the references reflect Eclectic medical thinking. Indeed, Health Canada's subtitle for the references, "Traditional Herbal (Eclectic) Medicines," prompts a question whether or not this seeming conflation of Eclectic practice with traditional medicine is justified. Various issues deserve reflection.

One is whether listed uses in Eclectic materia medica texts always capture therapeutic experiences found with preparations such as decoctions of *Sarracenia* likely used in conventional practice. Many Eclectic practitioners used manufactured preparations classed as 'Concentrated' (many known as 'resinoids') or, as came later, the more widely used 'Specifics', mostly tinctures, but stronger than those in conventional practice. The *Sarracenia* Specific Medicine label shown in Fig. 3 was one of many Specific preparations marketed by the Lloyd company and appreciated for their consistent quality.[45] Such products were said to be favourites 'with numbers of physicians, and all have been established by clinical observation in disease expression'.[46]

'Disease expression' referred to the specific symptoms associated with a particular disease as indicated in the following quotes from the Eclectic literature:

> it is a fact that disease has definite expression, which may be studied and learned, so that having learned the language of disease, we have a certain guide in diagnosis;[47]

and

> the Specific Medicines are not commended to cure diseases by name, but to serve the medical profession desiring to use specific or definite preparations to meet specific symptoms in disease expression,

or, as often expressed, symptoms in a 'pathological condition'.[48] Yet, while it was appropriate to make clear that botanicals relieved symptoms, information possibly


Specific Medicines.

SARRACENIA.

480 GRAINS TO FLUID OUNCE.
ABSOLUTE ALCOHOL

LLOYD BROTHERS, Cincinnati, Ohio

Specific Use.—Its functional influence promotes an abundant flow of limpid uriue. Said to powerfully antidote the poison of contagious diseases,—small-pox, lepra, measles, &c.; a remedy for syphilis and jaundice.
Dose—R. Sp. Med. Sarracenia, gtt. v to gtt. xx in water, every one to three hours.

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Figure 3. Facsimile of main part of label of a preparation marketed by Lloyd Brothers.

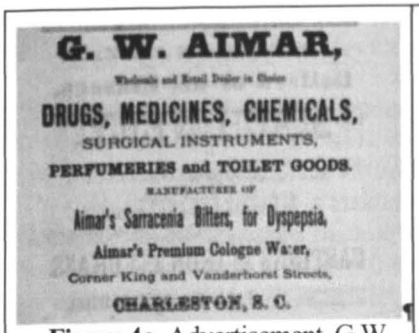
G. W. AIMAR,
Wholesale and Retail Dealer in Choice
DRUGS, MEDICINES, CHEMICALS,
SURGICAL INSTRUMENTS,
PERFUMERIES and TOILET GOODS.
MANUFACTURER OF
Aimar's Sarracenia Bitters, for Dyspepsia,
Aimar's Premium Cologne Water,
Corner King and Vanderhorst Streets,
CHARLESTON, S. C.

Figure 4a. Advertisement, G.W. Aimar, Charlestone, South Carolina.

Figure 4b. Aimar's Sarracenia or Fly Trap Bitters.

based on experiences with a single product need to be carefully evaluated, especially if the therapeutic uses are out of step with other information. After all, precise manufacturing details, even the part of the plant employed, were not publicly disclosed. Consider, for example:

(i) Theoretical considerations cannot be discounted in listed symptomatology. In some cases, rather than empirical clinical observation,

> the relation has been established by proving the remedy on healthy persons, and determining by this its quality of action, and its affinity for special parts. This is the homoeopathic method ... But this is also the physiological method; for, the influence of a drug having been determined, as to its quality and selection of special organs, parts or functions for its action, the agent is employed when such action is required. [49]

(ii) Despite the commercial success of Specifics and claims that their symptomatology was backed by extensive experience, practitioners could rarely relieve all symptoms presented by a patient. Outcomes could reflect a particular regimen and other variables affecting therapeutic outcomes. It is also worth noting that translating Eclectic teachings into everyday practice was not easy for inexperienced practitioners, for instance when textbooks linked a botanical specifically to a disease label (as in conventional medical books) without reference to symptomatology.

(iii) The favourable disposition of Eclectics toward botanicals, especially native remedies, can be another issue when evaluating Eclectic literature. On one level, confidence in botanicals encouraged challenging questions about conventional medical views. John Scudder, a leading figure in the Eclectic movement, for example, essentially asked whether conflicting results in the *Sarracenia* smallpox controversy resulted from differences between fresh and dried root. As he said,

> When fresh, it is bitter and astringent, having a somewhat pungent impression on the fauces. The specimens I obtained had no taste.[50]

Yet, on another level, the danger also lurked of cognitive biases linked to a mind-set of reforming conventional medicine that opened the door to dismissing contrary opinions (a charge also to be levelled at conventional medicine).[51] Eclectics, with an eye on theory, even notions of a drug possessing vitalist forces, might take a less than critical approach to the clinical assessment of, say, a Specific Medicine at a time when the level of acceptable 'experience' was changing. One might wonder about the strength of the clinical experience behind a formula in John King's *American Eclectic Obstetrics* (1871). This included *purpurea* extending its tonic reputation to stimulant action on the uterus:

> an infusion of the leaf, or root, is also efficacious in amenorrhoea, dysmenorrhoea, or other functional derangements of the uterus, connected with [its] sluggish or torpid condition.[52]

All in all, by using Health Canada guidelines it would be possible to selectively excerpt statements from two of their references to support 'traditional' usage of Sarracenia (cf. Ellingwood and Grieve). However, appraisal of a wide range of information (and lack of information) in the writings of different schools of medical thinking make this questionable, even for dyspepsia. It questions the use of a minimum of two references to meet Health Canada's own definition of basing traditional usage on 'the sum total of knowledge, skills, and practices based on theories, beliefs, and experiences indigenous to a specific culture'. Consistent patterns of information, ranging from conventional medical thinking to domestic or folk medicine are needed before deciding if a recorded use has a reasonable probability of a consistent action.

Figure 5. Canadian stamp (1966) recognising Newfoundland with the province's coat of arms, one of many stamps from around the world to feature a *Sarracenia*.

The pitcher plant has long been viewed as a curiosity, a curiosity occasioning stamps (Fig. 5), coins and ephemera beyond Newfoundland. Curiosity, too, has created poetry and perhaps helped to sustain a low level of medical interest that, from time to time, has thrown up uses out of character with accumulated information such as for diabetes and pain syndromes; one injectable product for pain management is particularly striking—a commercially marketed distillate from *S. purpurea* that initially (1930s) was a mixture of amines based on the 'flies, ants, mosquitoes, etc., which are trapped, digested and assimilated with a subsequent conversion of protein material into amino compounds'.[53]

The 'curiosity' long surrounding *Sarracenia* extends beyond the carnivorous appetite into a byway of medicinal plant history, but one that prompts reflection on just what is meant by 'traditional'.

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Endnotes and References

1. Bartram W. *Travels through North and South Carolina, Georgia, East and West Florida*. Facsmile of 1792 London edition. Savannah: Beehive Press, 1975: 415, describing 'Saracinia lacunosa' comparing it with *S. flava*.

2. Photograph of *Sarracenia purpurea* subsp *purpurea* from Maunder JE (originator, editor). *A Digital Flora of Newfoundland and Labrador*. http://www.digitalnaturalhistory.com/flora_sarraceniaceae_index.htm Accessed July 2014.

3. Most medical attention has been given to *S. purpurea*, but, as will be seen, some of its listed medical uses were initially linked to other species. The botany of the genus is complex with a number of species, subspecies and hybrids. The literature constantly refers to root, as used here, but in reality it is a rhizome. I published notes on *S. purpurea* in *Sarracenia*, Winter 1991/2 and Crellin JK. *Home Medicine. The Newfoundland Experience.* Montreal: McGill-Queens Press, 1994: 198-9.

4. Crellin JK. 'Traditional Use' Claims for Herbs: The Need for Competent Historical Research. *Pharm Hist* (Lond.) 2008; 38: 34-40. Health Canada's earlier time period was 30 years, now described as two generations: Health Canada, Pathway for Licensing Natural Health Products as Traditional Herbal Medicines, www.hc-sc.gc.ca/dhp-mps/prodnatur/ legislation/docs/tradit-eng.php#a2.5 Accessed July 2014.

5. Health Canada, in reference 4.

6. Available at http://naturaldatabaseconsumer.therapeuticresearch.com/home.aspx?cs=&s=NDC Accessed July 2014. The website uses *PDR for Herbal Medicines*. Montvale: Medical Economics Co., 2000: 596-7, rather than the 2007 edition (Montvale: Thomson) though the latter reprints the same information. A 'professional' version is more cautionary.

7. WebMD at http://www.webmd.com/vitamins-supplements/ingredientmono-103-PITCHER%20PLANT.aspx?activeIngredientId=103&activeIngredientName=PITCHER%20PLANT Accessed June 2013, no reference to smallpox; Dartmouth-Hitchcock Norris Cotton Cancer Center. http://cancer.dartmouth.edu/pf/health_encyclopedia/d05332a1 This site does not use the present tense.

8. Arndt W, Mitnik C, Denzler KL, et al. In Vitro Characterization of a Nineteenth-Century Therapy for Smallpox. *PLOS ONE* 2012; 7(3): e32610. doi:10.1371/journal.pone.0032610. Although the journal is highly regarded, it is perhaps disingenuous for the disclosure statement to say that, while grant support came from the Southwest College of Naturopathic Medicine, 'it had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript', for authors from the college were involved in conceiving, designing, and performing the experiments, analysing data, and writing the paper.

For the case histories, from the naturopath Brandie Gowey, who also indicates an association with the Southwest College of Naturopathic Medicine, http://www.howdoitreatnaturally.com/wp-content/uploads/2012/09/casestudytopical.pdf Accessed June 2013 and indirect reference to the above paper http://www.howdoitreatnaturally.com/ the-pitcher-plant/

9. For example, for stomach ailments, etc. Meyer JE. *The Herbalist*. Glenwood, Ill.: Meyerbooks, 1979: 96-7 (same as 1934 edition).

For references to smallpox: Tobe JH. *Proven Herbal Remedies*. St. Catherine's, Ont.: Provoker Press, 1969: 140, noting at one time that it achieved a great reputation; Lust J. *The Herb Book*. Toronto: Bantam Books, 1983: 342, (reprint of 1974) states that: 'the evidence [in the nineteenth-century controversy over effectiveness, see below] was not conclusive on either side. It is noteworthy that a major competitor in sales (Kloss J. *Back to Eden*. Loma Linda: Back to Eden Books, 1982) does not include Sarracenia under herbs for smallpox.

10. Grieve, M. *A Modern Herbal*. New York: Dover Publications, 1971, reprint of 1931, vol. 2: 640.

Grieve, as did others, may well have relied, in part, on an earlier popular book: Wren TC. *Potter's Cyclopaedia of Botanical Drugs and Preparations*. London: Potter & Clarke, 1932: 270 stating it to be 'Stomachic, diuretic, laxative. Useful in derangements of stomach, dyspepsia, menstrual complaints, &c.' (Same information as in the 1907 edition.)

11. Austin DF. *Florida Ethnobotany*. London: Taylor & Francis, 2004: 603-4, and Grover MG and Baumann TE. 'They worked their own remedy', African-American Herbal Medicine and the Archeological Record. *South Carolina Antiquities* 1996; 28: 21-32.

12. Morton JF. *Folk Remedies of the Low Country*. Miami: Seemann, 1974:137-8. Morton adds the 'spots on the leaves are a sign that the plant is a good remedy for skin troubles, a belief which harks back to the old Doctrine of Signatures.' But significantly not listed in Mitchell F. *Hoodoo Medicine, Sea Island's Herbal Remedies*. np: Reed, Cannon & Johnson, 1978. It is also noteworthy that *Sarracenia* is not included in such other compilations as *The Frank C. Brown Collection of North Carolina Folklore*. Durham: Duke University Press, 1961, vol. 6; and Mars KK. *Southern Folk Medicine 1750-1820*. Columbia: University South Carolina Press, 1999 in relation to a questionable long-standing tradition (see below).

13. See the wide range of uses for various first nations reported in 36 citations entered in the University of Michigan (D. Moerman) database, *Native American Ethnobotany* http://herb.umd.umich.edu/ Accessed June 2013. The robustness of the information in each citation of this invaluable compilation needs checking.

14. Lacey L. *Micmac Medicines: Remedies and Recollections*. Halifax: Nimbus Publishing, 1993: 26.

15. Personal communication. Saqamaw Mi'sel Joe, June 2013, a reflection of the plant's astringency. It is noteworthy that as a 'traditionally' based remedy for diabetes, *S. purpurea* has been shown in vitro to have antidiabetic activity: Muhammad A, Guerro-Analco JA, Martineau LC, et al. Antidiabetic Compounds from Sarracenia purpurea Used Traditionally by the Eeyou Istchee Cree First Nation. *J Nat Prod* 2012; 75: 1284-8.

16. Clusius C. [Charles de l'Écluse's] *Rariorum Plantarum Historia*. Antwerp. 1601: lxxxii; Gerard J. *The Herball or Generall Historie of Plantes*, London: Norton and Whitaker, 1633: 412; Parkinson J. *Theatrum Botanicum*, London: Cotes, 1640: 1235-6. Clusius' specimen apparently originated from Lisbon (see Clusius and Gerard) leading to the reasonable speculation that it came from Newfoundland via the Portugese cod fishery.

17. Josselyn J. *New England's Rarities*. (1674 ed. E. Tuckerman). Boston: Veazie, 1865: 104-6. Josselyn included a new illustration.

18. For Sarrazin's account, Boivin B. La Flore du Canada en 1708. *Études Littéraires* 1977; 10, No 1 (also as Provencheria No 9 Mémoire de l'Herbier Louise Marie, Université Lavel, 1978, no. 9: 286-287.) Sarrazin's description was published by de Charlevoix PF-X. *Histoire et Description Générale de la Nouvelle France*. Paris: Nyon Fils, 1744, Appendix end of vol 2: 37-8.

19. Erichson-Brown C. *Use of Plants for the Past 500 years*. Aurora, Ont.: Breezy Creeks Press, 1979: 203. Confirmation of Erichsen-Brown's claim has not been found in Vallée A. *Un Biologiste Canadien, Michel Sarrazin 1659-1735*. Québec: Proulx, 1927: 94. While Vallée notices the importance of Sarrazin's detailed description of *purpurea* and indicates its use for smallpox, he does not attribute its use directly to Sarrazin. Moreover, many manuscripts and unpublished materials are not generally available, see Rouseau, J. Michel Sarrazin, *Dictionary of Canadian Biography* on line. http://www.biographi.ca/en/bio/sarrazin_michel_2E.html Accessed July 2013.

20. General interest in aboriginal knowledge at the time is reflected in Manessah Cutler's 1785 comment: 'The savages seem to have had a better idea of the medical virtues of plants, than some who have imagined that vegetables, fit only for food, were the most proper for medicine.' (An Account of some of the Vegetable Productions Naturally growing in this part of America [Massachussets] Botanically Arranged? *Bull Lloyd Lib No. 7* (Reproduction series No. 4): 399. (Sarracenia not included.) For authors mentioned: Catesby, M. *The Natural History of Carolina, Florida, and the Bahama Islands*. London, 1731, vol. 2: 69-70 describes two *Sarracenia* spp.; Kalm P. *Travels into North America* (trans. Forster JR). Barre: Imprint Society, 1972 (reference to Sarrazin, p. 438); Bartram W. *Travels through North and South Carolina, Georgia, East and West Florida*. Facsimile of 1792 London edition, Savannah: Beehive Press, 1973: 415 describes 'Saracinia lacunosa' in detail without any indication of a medicinal reputation. No mention in such reference books ranging from James R. *A Medicinal Dictionary*. London: Osborne, 1743-5 to Hooper R. *Quincy's Lexicon-Medicum. A New Medical Dictionary*. Philadelphia: Carey, 1817.

21. 1822 reference: Cormack WE. (FA Bruton ed.) *Narrative of a Journey Across the Island of Newfoundland in 1822* London: Longmans Green, 1922:72.

Writings where a medical use, if well known, might be anticipated include: Barton B. *Collections for an Essay Towards a Materia Medica of the United States*. Philadelphia: author, 1798; Bigelow J. *American Medical Botany, Being a Collection of the Native Medicinal Plants of the United States*. Boston: Cummings & Hilliard, 1817-20; Raffinesque CS. *Medical Flora or Manual of Medical Botany of the United States of North America*. Philadelphia: Atkinson and Alexander, 1828-30, 2. vols. or his *Manual of the Medical Botany of the United States*. Philadelphia: np, 1841; Griffith RE. *Medical Botany: or Descriptions of the More Important Plants Used in Medicine*. Philadelphia: Lea & Blanchard, 1847.

With respect to Flora etc., even when Sarracenia mentioned: Raffinesque's edited version of *Florula Ludovicinana: or, A Flora of the State of Louisiana*. New York: Hafner, 1967 (Facsimile of 1817 edition); Pursh F. *Flora Americae Septionalis*. Braunschweig: Cramer, 1979 (reprint of 1814.) Pursh does note (p. 367) that it is a 'desirable object in the collection of the admirers of nature; they bear cultivation in pots.'); Elliott S. *A Sketch of the Botany of South Carolina and Georgia*. Charleston: Schenck, 1816-24, vol. 2; Croom HB. Observations on the genus Sarracenia; with an Account of a New Species. *Ann Lyceum Nat Hist New York Acad Sci* 1848; 4: 95-104.

22. Anspach LA. *A History of of the Island of Newfoundland*. London: author, 1819: 362.

23. Porcher FP. An Examination into the Medicinal and Chemical Properties of the Sarracenia flava and variolis (side-saddle flower, fly traps). *Charleston Med J & Rev* 1849; 4: 1-13, and Porcher FP. *Resources of the Southern Fields and Forests*. Richmond: West & Johnson, 1863: 53-4.

24. Miles HC. Indian Remedy for Small-pox. *Lancet* 1861; (2): 550-1; Morris FW. The Sarracenia Purpurea, A Remedy for Small-pox. *Amer Med Times* 1862; (i): 297-8, for quote. He described the Indians as MecMac rather than Micmac, now Mi'kmaq. It is noteworthy that he ended by saying that he was inclined to believe it would be shown to be valuable for other contagious disease, a notion often picked up later.

25. Logie CG. A Remedy for the Small-pox. *The Times*, 26 May 1863: 9.

26. *Brit Med J* 1863: (ii): 212-13.

27. Ignored in such textbooks (all in many editions): Bartholow R. *A Practical Treatise of Materia Medica & Therapeutics*. New York: Appleton, 1881; Farquharson R and Woodbury F. *A Guide to Therapeutics & Materia Medica*. Philadelphia: Lea's Son, 1882 American edition; Stillé A. *Therapeutics and the Materia Medica*. Philadelphia: Lea, 1864 (brief mention in 1874 edn, vol. 1, p. 627); Hale White W. (ed. R. W. Wilcox). *Materia Medica, Pharmacy, Pharmacology and Therapeutics*. Philadelphia: Blakiston, 1900 (American edition of British text); Wood GB. *A Treatise on Therapeutics and Pharmacology or Materia Medica*. Philadelphia: Lippincott, 1868, 2 vols.; Shoemaker JV. *A Practical Treatise on Materia Medica and Therapeutics*. Philadelphia: Davis, 1893. 2 vols.

For medical reference books: Foster FP. *An Illustrated Encyclopaedic Medical Dictionary*. New York: Appleton, 1894, vol. 4: 2752 did mention, without comment that *S. Purpurea* 'has been recommended in smallpox,' while stating it 'is used' by Indians for venereal disease. An abridged version (1897) stated: 'now but little used in medicine' (Foster F (ed.) *Reference Book of Practical Therapeutics*. New York: Appleton, 1897, vol. 2: 156, while a publication of the North Carolina Agricultural

Station in North Carolina the following year in a surprising note indicated that only Sarracenia variolaris Michx (spotted trumpet leaf, small-pox plant) had 'attained the same notoriety as a cure for smallpox, but has long lost its reputation.' (Medical Plants which have been collected and used in North Carolina. Bulletin No. 150 North Carolina Agricultural Experiment Station. 1898: 337.)

28. Remington JP, and Wood HC. *The Dispensatory of the United States of America.* Philadelphia: JB Lippincott Company, 1918 from Henriette's Herbal Homepage http://www.henriettes-herb.com/eclectic/usdisp/sarracenia.html Accessed July 2014.

29. Wood GB and Bache F. *The Dispensatory of the United States of America.* Philadelphia: Lippincott, 1868: 1596. It is noteworthy that the 1854 edition (Philadelphia: Lippincott, p. 1388), quickly reported on Porcher's 1849 paper, noting the two *Sarracenia* spp. as a non-officinal drug. The authors offered no editorial comment except uncertainty about dosage while stating that 'Invalids chew it as they would chew tobacco,' and that as a powder it suggested 'half a drachm three or four times a day.

30. Stillé A and Maisch JM. *National Dispensatory.* Philadelphia: Lea, 1879: 1267-68.

31. Clift H. *The Evening Telegram.* 20 October 1891: 4. The letter was precipitated by the visit of the Kickapoo Company to St. John's reminding the writer of the value of native remedies. Logie's account also appears in a recently reprinted homoeopathic text: Choundhuri NM. *A Study on Materia Medica (An Ideal Text-Book for Homeopathic Students).* New Dehli: Jain, 1993: 657-659.

32. Johnson L. *Manual of Medical Botany of North America.* New York: Wood, 1884: 84-86.

33. Bentley R. *A Manual of Botany.* London: Churchill, 1882: 436. To this one can add that Boulger GS. noted only that *S. Purpurea* 'recommended as a remedy in small-pox is valueless.' *The Uses of Plants. A Manual of Economic Botany.* London: Roper and Dowley, 1889: 77. Sarracenias were not included in the majestic volumes of Bentley R and Trimen H. *Medicinal plants.* London: Churchill, 1880.

Pharmacognosy texts, more for pharmacy students with their emphasis on identifying characteristics of vegetable drugs in crude and powdered form, rarely noted Sarracenia. One exception by Lucius Sayre (1917) with merely three lines indicating tonic and diuretic properties *S. flava* and *purpurea* as being much used for dyspepsia in the southern United States (*A Manual of Organic Materia Medica and Pharmacognosy.* Philadelphia: Blakiston's Son, 1917: 210.)

34. Goodenough J. *The Favorite Medical Receipt Book and Home Doctor.* Detroit: Dickerson, 1907: 593. Not included in other well-known home medicine books of the post 1860s to early 1900s: For example, Beard GM. *Our Home Physician.* New York: Treat, 1875; Naphys GH. *The Prevention and Cure of Disease.* Springfield: Holland, 1875; Warren I, et al., *New Warren's Household Physician.* Boston: Bradley, 1903.

35. Hale EH. *Homoeopathic Materia Medica of the New Remedies in Homoeopathic Practice.* Detroit: Dr EA Lodge, 1867: 937-61.

36. Millspaugh CF. *American Medicinal Plants; an Illustrated and Descriptive Guide to the American Plants used as Homoeopathic Remedies.* New York: Boericke & Tafel, 1887, monograph 19. A reprint, *American Medicinal Plants.* New York: Dover Publications, 1974, monograph 19 (in turn, a reprint of 1892 edition) added to the advocacy herbal literature since the 1960s.

37. Health Canada has licensed three homoeopathic *Sarracenia* products.

38. Ellingwood F. *American Materia Medica, Therapeutics and Pharmacognosy.* Evanston: Ellingwood's Therapeutist, 1915: 398-399.

39. Not included in Petersen FJ. *Materia Medica & Clinical Therapeutics.* Les Olives California: Petersen, 1905; or Felter HW. *The Eclectic Materia Medica, Pharmacology and Therapeutics*, 1922 through http://www.henriettesherbal.com/eclectic/felter/ Accessed July 2014.

A sense of ambivalence appears in the well-known *King's American Dispensatory* of 1898. The editors begin by stating that 'the therapeutical actions of sarracenia are not fully ascertained. It is supposed to be a stimulating tonic, diuretic, and laxative.' However, the authors added: 'in connection with Osmunda regalis and blue cohosh, it will form a valuable syrup for chlorosis, *uterine derangements, dyspepsia*, and other gastric difficulties,' and that 'the root is useful in all cases where there is a sluggish, or torpid condition of the stomach, the intestines, the liver, the kidneys, or the uterus, producing *costiveness, dyspepsia, sick headache, amenorrhoea, dysmenorrhoea,* and the various functional derangements which are so commonly to be met with.' They did not accept the use for smallpox. Taken from Henriette's Herbal Homepage http://www.henriettes-herb.com/eclectic/kings/ sarracenia.html Accessed July 2014. Passage unrevised in Felter HW and Lloyd JU. *King's American Dispensatory.* Cincinnatti: Ohio Valley Co. 1905: 1725-6.

40. Ellingwood, note 39. For early extrapolation, Morris, note 25.

41. The illustration is one of a large number of sample labels in Bell VJ. *Dose Book of Specific Medicines.* Cincinnatti: Lloyd Brothers, 1907: 209.

42. Sharpe & Dohme. *Catalogue of Medicinal Fluid & Solid Extracts, Elixirs &c.* Baltimore, 1870: 14. Also, Eve's cup (as *S. flava*) sold under Pressed Herbs, Roots and Barks in *Prices Current McKesson & Robbins.* New York, 1879: 81; by 1890, Parke, Davis offered a fluid extract and the root 'in pound packages for retailing purposes.' (Parke, Davis & Co, *Organic Materia Medica.* Detroit: Parke, Davis, 1890:142, omitted from the company's *Manual of Therapeutics.* Detroit: Michigan, 1909.) For Shaker companies, Miller AB. *Shaker Herbs. A History and a Compendium.* New York: Potter, 1976: 216, 250.

43. 1858 reference: 1858; viii: 721. Various advertisements, e.g. News and Courier [Charleston] 19 May 188: 4; for example advertisement: http://charlestondailyphoto.blogspot.ca/2010/03/aimars-sarracenia-bitters-for-dyspepsia.html; illustration from Waring Historical Library Artifact Collection, Low Country Digital Library Catalog as part of a series of pictures of Aimar bottles G. W. Aimar & Co., Charleston, SC, on Civil War Medicine (and writing): http://civilwarmed.blogspot.ca/2013/02/palmetto-state-druggist-gw-aimar-co_19.html Accessed June 2013.
44. For list of references see Health Canada, note 4.
45. Berman A and Flannery MA. *America's Botanico-Medical Movements Vox Populi*. New York: Haworth Press, 2000 gives a detailed account of manufactured Eclectic remedies.
46. Bell, note 42, p. 50.
47. Locke FJ (Felter HW, ed.) *Syllabus of Eclectic Materia Medica and Therapeutics*. Cincinnati: Scudder Bros Co, 1901: 7. http://www.herbaltherapeutics.net/syllabus.pdf Accessed August 2013.
48. Bell, note 42, p.4.
49. Locke , note 48, pp. 8-9.
50. *Specific Medication and Specific Medicines*. Cincinnati: Wilstach, 1881: 233-5. Same as in 1884 edition, pp. 233-6, but not in that of 1909.
51. For a sense of ongoing commitment to reform, Jones EG. *Definite Medication*. Boston: Therapeutic Publishing Co., 1911. Conventional textbooks tended to be conservative in the introduction of new remedies. For example, R Bartholow noted limited new remedies as 'nitro-glycerine, curare, muscarine, resorcin, etc.' in his *Practical Treatise of Materia Medica and Therapeutics*. New York: Appleton, 1881: v.
52. King J. *American Eclectic Obstetrics*. Cincinnati: Wilstach, Baldwin, 1871: 736. He added that 'its virtues are not fully ascertained', maybe the reason it did not appear in King's *The American Family Physician*. Indianapolis: Douglas, 1878.
53. For one example of a poem, see Thornton R. *Temple of Flora*. London, 1799-1807: *Sarracenia flava* http://digital.library.wisc.edu/1711.dl/DLDecArts.ThornTempFlo 'Sarapin" is a regional analgesic' listed as a sterile aqueous solution of the soluble salts of the volatile bases' from the pitcher plant. For the initial preparation: Judovich BD. For the Relief of Pain. A Preliminary Report on a New Therapy. *Med Rec* 1936: 583-4.

Book Review

Newfoundland Drugstores: a history. John K. Crellin. Published by Flanker Press Ltd. Canada, 2013. Pp 209. ISBN 978-1-77117-282-0. Price $19.95

John Crellin has written this history of drugstores in Newfoundland from the Victorian era to the present. Drugstores in the 1800s were the equivalent to the Chemist and Druggist in the British Isles and were regulated in the same way. There was, however a strong connection to American pharmacy and products sold were of English, American and, to a lesser degree, Canadian manufacture. Some of the products included Sand Soap for dirty, oily, fishy hands, Bulls' Grease, used in the same way as Bears' Grease for strengthening the hair, and Florida Water which was a mixture of Lavender Water and Eau de Cologne that became very popular during the Prohibition Era in the USA as it contained a high proportion of alcohol. The most famous Newfoundland product was Cod Liver Oil from the local fisheries. In 1914 American-style soda fountains were introduced.

Until 1949 Newfoundland was under British jurisdiction. Canadian Confederation put pharmacy in Newfoundland under Canadian legislation. New narcotic and food laws were introduced and the drugstores were modernised.

The paperback is 23cm x 15 cm x 1.4cm. There is an Index at the back and copious endnotes at the end of each chapter. Black and white illustrations are numerous.

The history of pharmacy and drugstores in Newfoundland is very similar to that of Britain. The difference is the range of products sold and the way that the local needs influenced the development. John Crellin gives us an informative and easy-to-read insight into these factors.

Peter Homan

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Founded 1967

British Society for the History of Pharmacy

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Please note that the February evening meeting will be held at the RPS, 1 Lambeth High Street, starting with refreshments at 5.00 pm. The RPS is expected to move to its new headquarters by May 2015.

Monday 9 February 2015
'Tropical Plants in European medicine' by Mark Nesbitt, Centre for Economic Botany, Kew. Lambeth, 5.30 pm.

Monday 18 May 2015
Joint meeting with the Friends of the Archives, Society of Apothecaries to view displays of the Museum of the RPS **at its new new headquarters** at 58 East Smithfield, London E1W 1AW.

Monday 12 October 2015
'Joseph Banks' by Andrew Sankey. At new RPS headquarters at 58 East Smithfield, London E1W 1AW.

British Society for the History of Medicine, 26th Congress 2-5 September 2015, Leeds

The congress will be held at Weetwood Hall, Leeds on the themes 'The good, the bad and the unknown (people, events and discoveries)' and First World War Medicine. Preliminary information is available at http://www.bshm.org.uk/Congress.asp?ID=5

BSHP Conference 2015

The 2015 Conference will be held from Friday 27 March to Sunday 29 March in Sunderland. The cost will be held at £300, as this year.

The Conference will be at the Best Western Roker Hotel, Roker Terrace, Sunderland, Tyne And Wear, SR6 9ND. This is a sea front hotel about 1 mile from the city centre. There will be no pre-arranged activity for Saturday afternoon but Sunderland Winter-gardens have an interesting museum, or you can visit the National Glass Centre, The Washington Wetlands Centre, or Beamish Museum.

The main theme will be '*The Apothecary*' to commemorate the Apothecaries Act of 1815 but as the national commemoration of WW1 continues until 2018 papers or posters on either topic will be welcome together with contributions on pharmacy topics relevant to the North East and Sunderland. Paper or Poster titles to Shirley Ellis as soon as possible please: shirleyellis@shirlellis.plus.com

International Congress for the History of Pharmacy, Tuesday 8 to Friday 11 September 2015, Istanbul, Turkey

The 42nd International Congress will be held at the Istanbul University Convention Center on the theme of the 'Exchange of Pharmaceutical Knowledge Between East and West'. Preliminary information is available at www.42ichp.org.

International Society for the History of Pharmacy
The 2014 ISHP newsletter is available at www.histpharm.org/IGGP%20Newsletter_15_2014.pdf

The pharmaceutical use of Lapis Lazuli in the Ancient East

Dr Christopher J. Duffin
Sutton, Surrey

Technically, lapis lazuli is a rock, since it is made up of an association of several different minerals.[1] The main component is lazurite, an aluminosilicate belonging to the feldspathoid sodalite group of minerals and possessing a somewhat varied composition. Its distinctive intense marine blue to violet blue colour (with lighter blue and green varieties also known) means that it has sometimes been confused with the copper carbonate, azurite, especially in older literature. It is typically metamorphic in origin, the bulk of geological occurrences being related to the contact metamorphism of limestones, dolomites and evaporates. The rock has been the subject of several brief overviews.[2] Historically significant deposits were located in Badakhstan (northern Afghanistan and referred to in 13th century accounts by Marco Polo), Pamir (Russia), the Atlas Mountains (North Africa), Latium, Vesuvius and the Albano mountains (Italy). Significant quantities of the rock were probably produced in Iran during the 13th and 14th centuries, according to some medieval Arabic sources. Extraction was carried out by means of fire-setting, right into the early 19th century.[3] Lapis lazuli was highly valued in Mesopotamia and the Mediterranean region as a decorative building stone, a symbol of dignity, in various ritual and magical contexts, in votive offerings, as royal gifts and tributes, and as stones in a wide variety of items of jewellery.[4] It was also the base material for the production of the artists' pigment, ultramarine,[5] and used in the dyeing of cloth. The intense blue colour is believed to be a function of the complex chemistry of the various oxides of sulphur in the crystal lattice.[6]

The objective of the present paper is to examine, for the first time, the historical use of lapis lazuli as a geopharmaceutical material. Further papers in this series are intended to trace the use of lapis lazuli within the western European and Arabic medical traditions until its elimination from the materia medica at around 1750.

Ancient Egyptians

Traded with Afghan suppliers, probably via Turkey, lapis lazuli was employed by the ancient Egyptians from pre-dynastic times onwards for the production of beads, scarabs, amulets and other small objects, as well as a colouring agent.[7] It seems that colours were deeply symbolic; the blue of lapis lazuli was associated with joy, delight and tranquillity – it was the colour of heaven.[8] Used extensively in the tomb of Tutankhamun (18th Dynasty pharaoh reigning from circa 1332–1333 BC), lapis lazuli was used for the eyebrows, eyelids and kohl marks on the death mask of the young king whilst a lapis substitute, Egyptian Blue, was used for the decorative stripes on the nemes or headcloth of the gold mask, and also to provide the inlay on the plaited false beard. This use of the authentic lapis emphasises a connection with the eyes in Egyptian culture.

Egyptian medical writings are mostly found on stelae (stone or wooden blocks) and ostraca (shards of pottery or clay tablets), as well as specialised medical papyri. Amongst the latter, the Ebers Papyrus, now held by the University of Leipzig, is the most extensive. The 20m-long scroll contains 110 pages and was supposedly found between the legs of a mummy in the Assassif area of the Theban necropolis on the East bank of the River Nile. It is believed to date from 1534 BC, having been written during the reign of Amenhotep I, second pharaoh of the 18th Dynasty. Two recipes in the papyrus refer to the use of lapis lazuli in treatments of the eye.[9] Recipe 378 recommends 'real' lapis lazuli (i.e. not the Egyptian Blue synthetic glass equivalent) mixed with green and black eye paints or 'kohls' (based on malachite and galena respectively), crocodile dung and two rather obscure herbal components in a milk base. The mixture was applied to the outside of both eyes to 'eliminate stasis of water', a condition believed to be cataracts. Recipe 390, this time to 'eliminate blood vessels in both eyes' (presumably dilated conjunctival capillaries or conjunctivitis) recommends applying a 'ductile dough' comprising equal parts of green and black kohls, lapis lazuli, ochre and honey to the eye surfaces.

A limestone ostracon at the Metropolitan Museum of Art (New York) contains a prescription for hysteria comprising lapis lazuli, 'green stone' (malachite), a fumigant ('Ki-bu'), one herbal component ('Ssyt') and raisins, all mixed together in a jug of wine.[10] Hysteria was supposedly caused by internal movement of the uterus. According to Plato (circa 428–348 BC),

> The womb is an animal which longs to generate children. When it remains barren for a long time after puberty, it feels wroth, it goes about the body, closing the tissues for the air, stopping the respiration, putting the body into extreme dangers.[11]

The resulting characteristic and uncomfortable sensation of having a mass embedded in the oesophagus or trachea (globus hystericus) is a psychological disorder allied to anxiety, and still little understood today.[12]

Assyrians

The kingdom of Assyria (late 25th century–605 BC) was located in the area of present-day northern Iraq. The capital city of the Neo-Assyrian Empire was Nineveh situated on the opposite bank of the River Tigris to present-day Mosul, and razed to the ground by besieging Medes and Babylonians. Towards the end of its existence, Nineveh was home to the famous library of Ashurbanipal (685–circa 627 BC), the last of the Neo-Assyrian strong kings. Excavation of the mound-ruins of Kouyunjik begun in 1847 by Sir Austen Henry Layard (1817-1894) yielded (in 1849) a collection of between 20,000 and 30,000 cuneiform tablets from Ashur-banipal's library, the bulk of which made their way to the British Museum. Amongst these is a range of medical texts, first studied by Reginald Campbell Thompson (1876-1941).[13] Here, lapis lazuli is recommended

crushed in curd or ghee (an unclarified butter) as an eye ointment in cases of ocular complaints caused by 'the Hand of Ghost'.[14]

One tablet (K.4120; Fig. 1) also blames dazzling of the eyes on Hand of Ghost, and prescribes lapis lazuli plus a mixture of other geological and herbal ingredients, finely crushed together on copper and applied continuously to the eyes as an ointment in 'suet of the kidney of a black ox'. [15]

Amongst the various remedies for oral complaints, one cuneiform tablet recommends the amuletic use of lapis lazuli, hung on a thread around the neck, together with similar beads of cinnabar, iron oxide and alabaster.[16] 'If the hand of a ghost seizes on a man, and his ears sing', the recommended treatment was to crush lapis lazuli together with myrrh, powdered arsenic, 'green stone' (perhaps verdigris or malachite) and, bound together with cedar oil, use it to anoint the ear lobes as well as inserting it into the ear itself in order to effect a cure.[17] Together with another 26 stones, including magnetite, carnelian, coral and jasper, lapis lazuli was recommended for 'emplacement of the intense pain of hand of ghost', and if bound to the site of the pain, alleviated the symptoms.[18] If powdered lapis lazuli, haematite, plus a range of other stones and botanical ingredients (many of the identities of which are currently obscure) were continually rubbed in a solution of oil upon the temples, neck and eye sockets of a patient whilst reciting an incantation which is translated as 'The pointing of the evil finger of mankind', disease was guaranteed to be removed.[19]

The combination of incantation with the magico-medical employment of lapis lazuli, (together with a range of other geological and herbal ingredients) was also used in cases where a frightening array of symptoms indicated that 'a roving ghost' afflicted the patient. The symptoms included pain in the breast, scalp and temples, roaring in the ears, numbness, shortness of breath, depression, chills, a crushing sensation in the chest, shortness of breath and persistent vomiting; the patient was perceived as specifically being under the Hand of Marduk, the somewhat capricious Babylonian deity who was deemed to exercise control over humanity.[20] The rather complex incantation, recited whilst holding the patient's hand (which held a representative figurine) and prostrated before a specially consecrated potter's pit, invoked Ea, the Sumerian and Akkadian God of creation and father to Marduk, to exorcise the sufferer from the influence of the God.[21]

Ancient Indian sources

The *Rasaratna Samuccaya* is a 13th century alchemical treatise from the late Tantric Period, named after the Hindu and Buddhist scriptures produced at the time. Written by Vagabhatacarya, this work explains the preparation and properties of mineral drugs.[22] The best quality lapis lazuli is taken to be that showing flecks of associated iron pyrites, also known as 'golden fly'. One possibly contemporaneous description of the rock recounts that 'lapis lazuli must be regarded as genuine and auspicious, which is without white flecks, is blackish

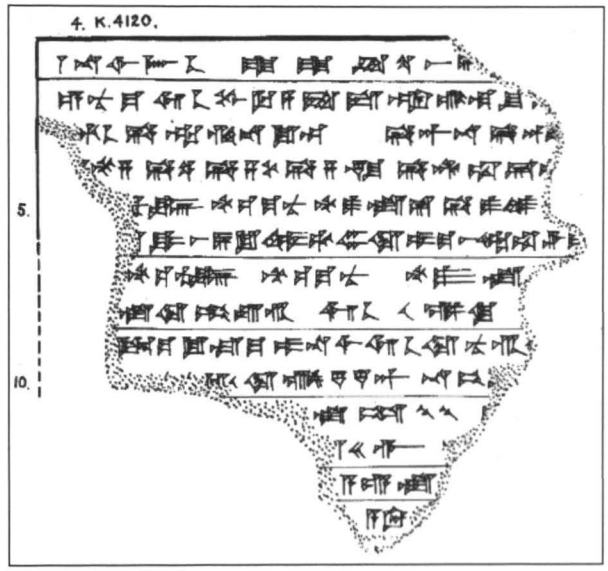

Figure 1. Figure 1. Assyrian cuneiform tablet (British Museum K.4120) from the library of Ashurbanipal at Nineveh (*circa* 620 BC), after Campbell Thompson (1923, plate 12 fig. 4).

or dark blue, smooth, heavy, pure, shining and like a peacock's neck'.[23] Incorporated into the specialised eye ointment, '*suma*', lapis lazuli was prepared by boiling in a mixture of cow's urine, lemon juice and salts prepared from various herbs for a period of six hours in a specialised earthenware pot (*Daula yantra*). Alternatively, the lapis lazuli could be oxidised to a red colour by a complex process involving mixing and grinding with sulphur and lemon juice, fashioned into the form of a tablet which was dried in the sun before being fired seven times in a specialised arrangement of two conjoined clay pots. This could then be used to treat 'aggravated bile', haemorrhoids, tuberculosis, jaundice, coughing and 'illnesses produced by humors of mucus and wind'. Furthermore, a paste or '*pishthi*' could be made for the treatment of dysuria, tuberculosis, jaundice, coughs, haemorrhoids, diabetes, insomnia, restlessness and neurosis. This involved grinding the stone with apple juice for a period of 14 days, stirring the mixture for three hours per day for three successive days, allowing the mixture to settle and then pouring off the supernatant apple juice. After drying and a further period of grinding, the paste was taken orally with honey, rose petal jam and *murabba* (a sweet jam pickle) of Indian Gooseberry (*Phyllanthus emblica,* formerly *Emblica officinalis*).[24]

Generally referred to as *Rājāvartah*, lapis lazuli also has the following synonyms: *Nilāśma*, *Nrpapalah*, *Suvarnadhātu*, *Rājādrī* and *Āvarta-manih*. In Ayurvedic medicine, it is traditionally believed to alleviate problems in each of the three humours or *doshas*. Based heavily on the *Rasaratna Samuccaya* cited above, plus the 13th century *Dhanwantari nighantu* and the 17th century *Raja nighantu*,[25] it is commended as having rejuvenating, nourishing, appetising, digestive and aphrodisiac qualities, and employed for urinary disorders,

tuberculosis, haemorrhoids, anaemia, hiccough, vomiting and even alcoholism![26]

Chinese and Tibetan sources

Geopharmaceuticals figure strongly in Traditional Chinese Materia Medica[27] but, possibly rather surprisingly, references to lapis lazuli are quite sparse. *Liu-li* is taken by some authorities to refer to lapis lazuli, whilst others think that the name applies to rock crystal (quartz).[28] Those identifying it and its synonyms as lapis lazuli indicate that the powdered mineral, or water in which the stone was dipped, was used to cure fevers and inflammation of the eyes.

One of the most venerated of the Tibetan Mahayana Buddhist pantheon is the Medicine Buddha, Bhaish-ajyaguru Vaiduryaprabha, or the Healing Master of Lapis Lazuli Radiance. Represented pictorially in the distinctive deep blue of lapis lazuli, wearing the robes of a monk and sitting cross-legged holding a myrobalan stem in one hand, he is revered as the source of the Tibetan healing arts, embodying the teaching of the Four Medical Tantras. These tantras are ascribed to the teaching of the Lord Buddha at the age of 72, and one tradition holds that they were translated into Tibetan by Vairocana during the 8th century AD. An alternative view is that the Tantras were gathered together and presented by Yuthong Yonten Gonpo II (1126-1202), one of a family lineage of royal court students and practitioners of traditional Tibetan medicine. Derived from this historical base, lapis lazuli is known by a number of synonyms in Traditional Tibetan Medicine, and esteemed for curing cases of poisoning, disorders of the lymph and leprosy. According to one text, it is even able to cure grey hair![29]

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Endnotes and References

1. Accessory minerals usually include pyrite, calcite and Haüyne.

2. Rosen, L von. Lapis lazuli in geological contexts and in ancient written sources. *Studies in Mediterranean archaeology and literature. Pocket-book 65,* 1988; da Cunha, C. *Le Lapis Lazuli.* Monaco: Editions du Rocher, 1989.

3. Wood, J. *A Personal Narrative of a journey to the Source of the River Oxus in the Years 1836-1838.* London: John Murray, 1841: 265.

4. Rosen, Ref. 1; Rosen, L von. Lapis lazuli in archaeological contexts. *Studies in Mediterranean archaeology and literature. Pocket-book 93,* 1990; Searight, S. *Lapis Lazuli. In Pursuit of a Celestial Stone.* London: East and West Publishing Ltd, 2010.

5. The earliest recorded use is from around 500 AD in wall paintings of Central Asia; Moorey, PRS. *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence.* Winona Lake: Eisenbrauns, 1999: 85; Merrifield, MP. *Medieval and Renaissance Treatises on the Arts of Painting: Original Texts with English translations.* Mineola, New York: Dover Publications, 1967: 340ff. Originally published in 1849; *Curiosa arcana: being curious secrets, artificial and natural. In three parts. ... From the last edition in French; which contains near as much ... printed for J. N.* Printed for T King in Little Brittain, 1711: 108-109.

6. Tauson VL, Sapozhnikov AN. On the nature of lazurite coloring. *Zapiski Vserossijskogo Mineralogicheskogo Obshchestva* [in Russian], 2003; 132 (5): 102-107.

7. Lucas, A & Harris, JR. *Ancient Egyptian Materials and Industries.* 4th edn. London: Histories & Mysteries of Man Ltd, 1989: 399; Herrmann, G. Lapis Lazuli: the early Phases of its Trade. *Iraq,* 1968; 30 (1) : 21-57.

8. Van Benthem, H. Coloring the Ancient Egyptian World. *The Ostracon. The Journal of the Egyptian Study Society,* 2006; 17 (1), 17-19.

9. Ghalioungui, P. *The Ebers Papyrus. A new English Translation, Commentaries and Glossaries.* Cairo: Academy of Scientific Research and Technology, 1987: 113, 116.

10. Coriat, IH. An Ancient Egyptian medical prescription for Hysteria. *Annals of Medical History,* 1921; 3 (1) : 12-16.

11. Plato, *Timaeus,* quoted in Ref. 10: 15.

12. Finkenbine, R & Miele, VJ. Globus hystericus: a brief review. *General Hospital Psychiatry,* 2004: 26: 78-82; Klein, DF. Panic Disorder and Agoraphobia: Hypothesis Hothouse. *Journal of Clinical Psychiatry,* 1996; 57 (suppl. 6): 21-27.

13. Campbell Thompson, R. *Assyrian Medical Texts from the originals in the British Museum.* London: Oxford University Press, 1923; Campbell Thompson, R. Assyrian Medical Texts. *Proceedings of the Royal Society of Medicine,* 1924; 17: 1-34; Campbell Thompson, R. Assyrian Medical Texts. II. *Proceedings of the Royal Society of Medicine,* 1926: 19; 29-78; Jastrow, M. The Medicine of the Babylonians and Assyrians. *Proceedings of the Royal Society of Medicine,* 1914; 7 : 109-176.

14. Campell Thompson Ref. 13, 1926: 39; See also Scurlock, J. *Magico-medical means of treating ghost-induced illnesses in ancient Mesopotamia.* Leiden : Brill, 2006: 368.

15. Campbell Thompson, Ref. 13, 1926: 43; the other ingredients are 'magnetic iron ore, mineral of lead, mil'u-salt, sulphate of iron, *sab*-stone, *subu*-mineral, *bal*-mineral, male copper, . . . tamarisk-seed, laurel-seed, seed of male Cyperus, and arsenic'. See also Scurlock, Ref. 14: 366.

16. Campbell Thompson, Ref. 13, 1926: 77.

17. Campbell Thompson, R. Assyrian Prescriptions for Diseases of the Ear. *Journal of the Royal Asiatic Society of Great Britain and Ireland,* 1931; 1: 1-25; Scurlock, Ref. 14: 404.

18. Scurlock, J. Ref. 14: 269-270, 441.

19. Scurlock, Ref. 14: 337-8.

20. Oshima, T. Babylonian Prayers to Marduk. *Orientalische religionen in der Antike*, 2011; 7: 58.
21. Scurlock, Ref. 14: 346-347.
22. Tripathi, ID. *Rasaratna Samuchchaya of Vagbhatacharya: Translated with 'Rasprabha' Hindi Commentary, Critical notes, and Introduction.* Varanasi : Chaukhamba Sanskrit Bhawan, 2006.
23. *Rajanighantu*, Chapter 13, verse 216; Winder, M. Vaidurya. In Meulenbeld, GJ. and Wujastyk, D (eds). *Studies on Indian Medical History.* New Delhi: Motilal Banarsidass, 2001: 90. The white flecks in the description refer to associated crystals of calcite.
24. Johari, H. *The healing power of gemstones in Tantra, Ayurveda, & Astrology.* Rochester: Destiny Books, 1997: 178-179.
25. Sharma, PV. The date of the Dhanwantari nighantu. *Indian Journal of the History of Science,* 1970; 5: 364-370; Prasad, PV. and Narayana, A. Biography of Narahari – the author of Raja-Nighantu. *Bulletin of the Indian Institute for the History of Medicine in Hyderabad,* 2007; 37 (1): 1-8; note that these dates are contested – Narahari is supposed to have written the *Rajanighantu* sometime between 1235 and 1250 according to Ramachandra Rao, SK. Encyclopaedia of Indian Medicine: historical perspective. *Encyclopaedia of Indian Medicine*, 1985; 1: 68, but is asserted to have flourished around 1500 according to Wujastyk, D. Jambudvipa: Apples or Plums? In Burnett, C, Hogendijk, JP, Plofker, K and Yano, M (eds). *Studies in the history of the Exact Sciences in honour of David Pingree.*Leiden: Brill, 2004: 288.
26. Sudarshan, SR. *Encyclopaedia of Indian Medicine. Volume Five. Materia Medica – Metallic and Mineral Drugs*. Bangalore: Dr V. Parameshvara Charitable Trust, 2005: 37.
27. Duffin, CJ. Lithotherapeutical research sources from antiquity to the mid-18th century. *In* Duffin, CJ, Moody, RTJ & Gardner-Thorpe, C. (eds.) *A History of Geology and Medicine.* Geological Society of London Special Publication, 375. (in press).
28. Smith, FP. *Contributions to the Materia Medica and natural history of China. For the use of medical missionaries and native medical students.* Shanghai: American Presbyterian Mission Press, Shanghai, 1891: 129; Read, BE & Pak, C. A Compendium of Minerals and Stones used in Chinese Medicine from the Pen T'Sao Kang Mu Li Shih Chen 1597 AD. *The Peking Society of Natural History Bulletin* 1928: 3 (2), 24. [Southern Materials Center reprint, 1982]; De Mély, F. *Les lapidaires de l'antiquite et du moyen age. Tome I. Les Lapidaires Chinois.* Paris : Ernest Leroux, Paris, 1896: 63, 258; Morgan, HT. *Chinese Symbols and Superstitions*. Los Angeles: Times-Mirror, 1942: 138.
29. Arya, PY. *Dictionary of Tibetan Materia Medica.* New Delhi: Montilal Banarsidass Publishers, 1998: 182.

'What the Dickens!' The Out-patients pharmacy at the Middlesex Hospital, London

Norma Cox
Wandsworth, London

In 1979 I was the staff pharmacist in charge of the out-patients department pharmacy at the Middlesex Hospital, London. The out-patients department was in a brick building in Cleveland Street. (See figure 1). It was a separate building from the main Middlesex Hospital in Mortimer Street. The out-patients department and the main Middlesex Hospital were connected by a myriad of underground passageways that allowed the movement of people, supplies and trolleys along narrow tunnels.

Figure 1. The out-patients department of the Middlesex Hospital in Cleveland Street.

The out-patients pharmacy was underground, beneath the out-patients building in Cleveland Street. Patients called in for their medicines, after seeing the consultants and registrars in their clinics in the out-patients block. The pharmacy had a reception area with seating for patients to wait. The dispensary led from the reception area. There was an area within the dispensary for the staff to have their tea-breaks and lunch. I don't recall where the toilet facilities were. I left this position at the end of 1979 and thought little of the place except for nostalgic memories with contemporaries.

I knew that the Middlesex Hospital had become part of University College Hospital NHS Trust in 1994.[1] The Trust had sold the Middlesex Hospital site for housing, offices and retail outlets to fund the University College Hospital Private Finance Initiative.[1] The Middlesex Hospital was then demolished in 2008 after anger and outcry.[2] Worse still, the new building works had been delayed and only the hospital's listed Chapel remained intact in the middle of a building site.[3]

In 2013 I visited the Middlesex Hospital site in Mortimer Street and found building works well underway, with completion dates predicted for 2014. I walked along Cleveland Street towards the Middlesex Hospital out-patients department expecting to find demolition or building works. To my amazement the out-patients building was still there. The perimeter wall was boarded by a wooden fence and workmen were busy.

Figure 2. The building in 2013.

The quadrangle at the front of the building, between the two projecting ends, where the ambulances used to wait, looked the same (Figure 2).

There is a campaign to save the Middlesex Hospital out-patients department.[4] The building has been identified as an original workhouse. It was built on the old pauper burial ground for St Paul's Church, Covent Garden in 1775-78. More importantly, it is likely to be the model for the workhouse described by Charles Dickens in *Oliver Twist*.[5] Dickens lived in Cleveland Street for two periods of his life, from 1815 to 1816 and 1828 to 1831. This information came to light when a medical historian, Ruth Richardson, researched the old workhouse in an attempt to save it from demolition. She made the discovery of a calling card used by Charles Dickens to gain employment as a short-hand writer. His address on the card was 10 Norfolk Street, but this street does not exist anymore. Using old maps, the address 10 Norfolk Street was found by Ruth Richardson to be the same as 22 Cleveland Street. He had lived and grown up nine doors from the workhouse. The Blacking factory in Chandos Street, where he was forced to work as a child while his father was in prison, was a few streets away. The threat of the workhouse must have terrified him.[5]

The efforts of Ruth Richardson have resulted in the Grade II listing of the Cleveland Street workhouse on 3rd March 2011.[6] She contacted Mr Dan Calinescu of the Toronto branch of the Dickens Fellowship, who had a copy of the Charles Dickens calling-card. The Fellowship has financed a blue plaque on the house at 22 Cleveland Street, which was erected on the 8th June 2013 to show that Charles Dickens had lived there.[4]

The appearance of the workhouse has remained basically unchanged since 1788, as evidenced by the account of Dr Joseph Rogers, Medical Officer of the workhouse in 1865 and the description in the survey of London in 1949.[5] It is one of three remaining Georgian workhouses in London. It was originally known as the Strand Union workhouse, later the Infirmary for the Central London Sick Asylum, and from 1865 it was known as the Cleveland Street Infirmary and then the Cleveland Street workhouse. It became part of the Middlesex Hospital in 1927 and remained as the out-patients department of the Middlesex Hospital until 2005.

The dire conditions in the Cleveland Street workhouse were reported in the *Lancet* in 1865.[7] In 1866 Charles Dickens wrote to Dr Joseph Rogers, the Medical Officer at the Cleveland Workhouse, praising his campaign for reform.[8] The article in the *Lancet* may have influenced the passing of the 1867 Metropolitan Poor Act.[7] A recent article by Ruth Richardson, states that there are 'plans which envisage the destruction of everything but the listed building'.[9]

So the building I worked in was immortalised in *Oliver Twist* and will be preserved.

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Endnotes and References

1. en.wikipedia.org/wiki/Middlesex Hospital
2. www.news.fitzrovia.org.uk
3. ezitis.myzen.co.uk/Middlesex.html
4. www.clevelandstreetworkhouse.org
5. charlesdickenspage.com/ruth_richardson-cleveland_street_workhouse.html
6. http://clevelandstreetworkhouse.org/news/
7. http://www.workhouses.org.uk/Strand/
8. en.wikipedia.org/wiki/Cleveland_Street_workhouse
9. http://spitalfieldslife.com/2013/10/12/at-the-workhouse-on-cleveland-st/

All accessed on 10 October 2014.

Knowledge of burn wound healing: the heritage from Traditional Pharmacy of Persia

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The traditional pharmacy of Persia is based on numerous ancient manuscripts written by the elites of medicine and pharmacy. These references which belong to different centuries (mostly from the 9th to 19th century) represent vast information about pharmaceutical and therapeutic knowledge. Studying these works could be valuable in revealing the hidden parts of the history of science,

especially pharmacy and medicine. Also, modernisation of the methods of treatment and the majority of formulations seems to be possible. It is obvious that setting ancient experiences besides recent studies makes pharmacists and physicians more powerful. This review aims to introduce traditional knowledge about different treatments for burn wounds which has been extracted from various Persian manuscripts.

Introduction

The discovery of fire by humankind seems to be the first step in a huge progress toward simple industries and other initial examinations;[1] however, man experienced the undesirable effect of fire on his body, i.e. burn wounds. While he was extremely exposed to nature, some nature-related events like sunburn, or burns due to lightning, were inevitable. So the smart creature started searching for solutions to the problem. Medicinal herbs and minerals were the most accessible options to relieve his injuries.[2] Ancient scientific treatises written by physicians in each civilisation prove their awareness of natural products' therapeutic effects. Traditional medicine in China, India and Egypt suggests various wound healing agents working with different mechanisms.[3-5] Nowadays researchers worldwide are trying to restore this worthy knowledge to life by examining primeval concepts and ideas through modern methods.[6] Most of these studies account for the initial stages of new drug discovery.[7] Ancient medicinal manuscripts from Persia contain extensive information about different wound categories, various wound healing agents, their mechanism of action and compound formulations efficient on wounds. This review aims to extract the knowledge of burn wounds treatment from ancient medicinal treaties of Persia including simple and compound formulations, modes of action and a brief statistical report about their effects and usages alongside the categorisation of burn wounds according their depth and origin.

Study method

Three main categories in ancient medicinal and pharmaceutical manuscripts were studied:

- simple medications,
- compound formulations, and
- therapeutics.

The information of materia medica (simple therapeutics) containing the origin (herbal or mineral), the herbal part used, the temperament, and mechanism of wound healing they are involved in, was extracted from *Makhzan-al-advieh*[8] and *Tohfat-al-Momenin.*[9] Two encyclopedias of dosage forms, *Qarabadin kabir*[10] and *Qarabadin Salehi*[11] were searched for compound formulations. Special chapters in *Tibb Akbari*[12] and *Sharh al-asbab va al-alamat*[13] presented wound categories and therapeutic guidelines of burn wound healing. The keywords for searching were Persian and Arabic terms for burn, burn wounds, blistering, fire, hot water and hot oil.

The next step was finding the scientific names of the mentioned materia medica and modernised terms for old-fashioned mechanisms of wound healing. Different attachments and appendices of newly rewritten works, like *Kitab al-Asrar;*[14] *Al-Mujaz fi al-Tibb,*[15] *Ketab al-saydana*[16] and *Useful plants and drugs of Iran and Iraq*[17] offer exact scientific names of materia medica, so they were used besides recent sources.[18-19]

Results

Different kinds of burn wounds have been described in the ancient scientific literature. While various sources can cause burn wounds, specialised treatments have been suggested.[12]

1. Wounds caused by *fire* are either mild (without blister) or moderate (with blister) to severe. Suitable herbal and mineral treatments will be discussed. This categorisation is almost similar to the modern division of burn wounds according to severity.[1]
2. Burns after touching *hot oils*. A combination of egg white and olive oil is recommended.
3. For burns due to *hot water* (scalds), using various kinds of refrigerants like cold infusion of ash or olive is essential.
4. If *lightning* causes a burn, it may be treated similarly to burns by fire.
5. *Toxic substances* make serum separated from blood. In these cases cupping is used, and then vinegar ointment is advisable.
6. *Sunburns* are likely to happen for sensitive skin. In such cases topical formulations made of vinegar or camphor are suitable choices.
7. If *alkaline agents* cause a burn on the tongue, mucilaginous blond *Psyllium* and almond oil will remedy the side effects.

Some factors had to be considered while selecting the medications. First of all, the prescribed formulation should be adjusted according patient's gender and temperament. Mild desiccants (to keep the wounds dry) are preferable for females and severe desiccants for males. The next point to be considered is the patient's diet. Foods containing meat and sugar ought to be partly limited, since they produce fresh blood and wound healing will be delayed. Any infection in the wound site will interfere with the healing process, so anti-infectives are vital in such cases.[13]

More than 60 wound healing agents are suggested by ancient Persian textbooks; of which three-quarters originate from plants (Table 1) and the remainder are minerals (Table 2). Obviously different mechanisms are responsible for their effects and the following definitions were extracted from ancient manuscripts.

(a) **Anti-bleeding**: avoids bleeding from wound site, so increases healing rate.

(b) **Anti-blistering**: avoids separation of watery liquids from blood.

(c) **Anti-infection**: removes any kind of infection or avoids penetration of infection.

(d) **Anti-inflammation**: stops or inactivates the inflammatory process.

(e) **Astringent**: causes constriction of wound.

Scientific name of plants	Part used	Traditional name	Temperament*				Characteristics which activate process of wound healing or lessen the burn effects														
			hot	cold	wet	dry	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
Acacia arabica L.	Gum	*Aqaqia*		1		3	•				•			•									
Althaea officinalis L.	Leaf (in olive oil)	*Khatmi*		<1	<1											•	•						
Arbutus unedo	leaf	*Qutloub*	2			2								•									
Arctium tomentosum	Root (cooked)	*Arqaitoun*	2			2					•			•	•	•							
Arnebia euchroma	Root (cooked in olive oil/with rose oil)	*Abukhalsa*	2			2								•									
Asphodelus ramosus	Stem	*Khonsa*	2			2						•		•		•							
Bambusa arundinacea	Powdered latex of stem	*Tabashir*		2		3					•			•		•							
Beta vulgaris L.	Leaf (cooked)	*Selq*	1		-	-					•				•	•							
Boswellia carterii	Oleo-gum-resin	*Kondur*	2			2	•		•		•			•	•		•					•	•
Brassica oleracea L.	Leaf/ Ash in eggwhite	*Kornob*	1			2								•			•				•		
Cistus ladaniferus	Aerial part in rose oil	*Lazan*	1			2					•	•				•	•	•					
Commiphora myrrha	Oleo-gum-resin (ash)	*Morr*	3			2					•			•	•							•	
Convolvulus arvensis	Extract/ leaf	*Leblab*	-	-		2										•					•		
Cordia myxa	Fruit peel (ash)	*Sapestan*	-	-	1**													•					
Cucurbita maxima	Fruit peel (ash)	*Qara*		2	2**		•													•			
Cupressus sempervirens L.	Leaf (ash/cooked in vinegar)	*Sarv*	1			3	•		•	•	•			•		•							
Cydonia vulgaris	Seed	*Safarjal*		2	2						•									•	•		
Cynara scolymus	Root	*Harshaf*	2			1	not mentioned																
Diospyros ebenum	Trunk (sawdust)	*Abnous*	2			2	•				•			•									•
Galium verum	Flower	*Qalioun*	1			2	•																
Gossypium herbaceum	Flower, leaf, ash	*Qoton*	2			2		•	•	•				•									•
Hypericum perforatum	Leaf, Aerial part	*Houfariqoun*	3			3			•			•		•		•	•						•
Lawsonia alba	Leaf (cooked in water)	*Hana*		<1		2	not mentioned																
Lepidium sativum	Aerial part (in vinegar)	*Horf*	2			2	not mentioned																
Lilium canditum L.	Leaf/ Root (cooked in rose oil)	*Susan*	2			2			•		•			•		•							•
Malva sylvestris	Leaf (in olive oil)	*Khobbazi*		1	1		not mentioned																
Morus spp.	Leaf (in olive oil)	*Tout*	?	?	?	?	not mentioned																
Musa spp.	Fruit peel (ash)	*Mouz*	≈0	≈0	2**		•	•			•			•				•					
Myrtus communis	Leaf (alcoholic extract)/ Fruit (cooked in wine)	*As*		1		2	•	•		•	•												
Narcissus tazseta	Root	*Narjes*	<3			<3	•								•				•				
Ocimum basilicum	Leaf	*Hamahem*		1		1										•							
Olea europaea	Fruit (unripe)	*Zit*		1		1<								•									
Pinus spp.	Leaf/ Root peel	*Sanobar*	3			3					•			•					•				•
Plantago major	Leaf	*Lasanolhaml*		2		2			•		•			•	•					•			•
Platanus orientalis	Leaf (dried)/ Trunk bark (ash)/ Fruit	*Dolb*		***		***					•			•	•								
Portulaca oleracea	Aerial part(in rose oil)	*Baqlatolhomqa*		3	2						•									•			
Rosa damascene	Flower/ Flower in oil	*Vard-e-ahmar*		1		2			•		•	•		•	•				•				•
Sambucus nigra	Leaf	*Khaman*		2		2				•				•		•							
Scabiosa arvensis	Extract	*Mamitha*		2		2				•	•					•							
Sempervivum tectorum	Aerial part	*Abroun*	2			1	•				•												
Sesamum indicum	Seed/ Oil	*Samsem*	1		1			•										•					
Solanum nigrum	Fruit	*Enabo-salab*		2		2				•	•	•								•			
Tamarix gallica	Dried leaf	*Tarfa*		1		2					•			•	•	•							
Tragopogon pratensis	Leaf/ flower	*Lahiat-ottis*		2		3	•		•	•	•								•				•
Trigonella foenum-graecum	seed	*Holbe*	2			2										•	•				•		
Acetum	Product of fermantation	*Khall*		2		3			•	•	•	•		•									

Table 1: Herbals suggested for burn wound healing in ancient Persia and their individual information (scientific and common names/part used/temperament/mechanism of healing).

*According to scientists' belief, each substance is rated with opposite qualities including warmth and coldness, wetness and dryness. The least degree is 0 which shows equilibrium of opposite qualities and the highest degree is 4, with 1, 2 and 3 in between.[23] These degrees are related to different compounds existing in herbals or minerals. (Various compounds are responsible for different temperaments.)

**The temperament mentioned belongs to the original substance, not its ash.

*** The exact degrees have not been found.

Mineral (*=main compound)	Traditional name	Advised formulation	Temperament				Characteristics which activate process of wound healing or lessen the burn effects															
			hot	cold	wet	dry	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
–	*Tin-e Qimoulia*	-		*		*		•			•			•		•	•		•				
*$2PbCO_3.Pb(OH)$	*Esfidaj*	-		3		3						•	•	•						•			
*$Al.K(SO_4)_2.12H_2O$	*Shabb*	solution in water	2			3	•	•					•	•					•				
*Borate salts	*Melh-e bouraqi*	in olive oil	2			3		•															
Euspongia officinale L.	*Esfanj*	in vinegar	1			2	•							•		•			•				
*Fe_2O_3 (Haematites)	*Shadanaj*	-		1		2	•				•		•	•									•
*HgS	*Zanjefer/Shangarf*	in oil & wax	2			2	•				•			•									•
Ink	*Medad/ morakkab*	in vinegar or water	2			2					•			•					•				
Nacra perlarum	*Sadaf*	ash in eggwhite	<1			<1	•					•			•								
Ovum(shell)	*Baiz*	-		2		2								•	•								
*Pb_3O_4	*Osranj*	in rose oil or olive oil		<3		3<	•		•	•			•		•	•			•				•
*PbO	*Mordasanj*	-		1		3	•				•		•	•	•	•			•				•
*Sb_2S_3	*Ethmed/ Kohl*	in animal fat		2		3	•		•		•		•	•								•	
Slaked lime	*Kels*	in lard (pig fat)		≈0	≈0		•																
*Zn_2CO_3	*Eqlimia*	-	?	?		1<			•				•	•									•

Table 2: Minerals used for burn wound healing in ancient Persia and their individual information (main compound and common names/advised formulation/temperament/mechanism of healing)

* While the minerals existing in nature are not pure, the main omponent of the mineral is shown with a star.

? : No information about the temperament was found.

≈0: shows the equilibrium of different qualities (warmth and coldness, wetness and dryness)

(f) **Attenuant**: Medications with mild warmth of temperament able to attenuate the substances aggregated in the wound site.

(g) **Debridement**: removes dead or damaged tissue from a wound.

(h) **Desiccant**: keeps wound dry.

(i) **Detergent**: stimulates viscous substances and expels them from surfaces.

(j) **Discutient**: the hot temperament of some medications makes attached substances separate and then expels them in gaseous form.

(k) **Maturant**: ripens the aggregated substances and facilitates their elimination.

(l) **Pain calmative**: controls pain.

(m) **Promote healing**: increases healing rate.

(n) **Refrigerant**: causes feeling of coolness.

(o) **Softener**: makes the wound site smoother.

(p) **Tissue adhesive**: joins the edges of wound.

(q) **Tissue expander**: causes tissue growth and fills wound.

Name of compound formulation	Components	Proportion of components	Usage consideration
White ointment[10,11]	*Esfidaj* *Camphor* *Yellow Wax* *Sesame oil*	5U 3U 4U 1U	Preparing patches saturated with this formula is advisable.
Camphor ointment[10]	*Rose oil* *White Wax* *Camphor* *Esfidaj*	15U 4U 1U 10U	Oily phase should be melted first, then fine powders added.
Esfidaj ointment[10] (prescribed by Avicenna)	*Powdered Esfidaj* *Olive oil* *Purified vinegar*	2U 2U 10U	Mixing should be done slowly. Should essentially be stored in clay or glass containers.
Burn lotion[11]	*Boureh Armani* (=$NaCO_3$, $NaHCO_3$) *Lawsonia leaves* *Myrrh* *Rose oil*	1U 1U 1U NM	The powders should be added little by little in order to homogenisze preparation.
Lotion for pain relief[11]	*Lens esculenta* *Rosa damascene* *Esfidaj* *Barley flour* *Rose oil*	NM NM NM NM NM	Lentilsand rose flower should be cooked. It is essential that mixing the fine powders and homogenising be continued for long time.

Table 3. Samples of compound formulations suggested for burn wounds according to *Qarabadin* books.
U: Unit(s), NM: not mentioned.

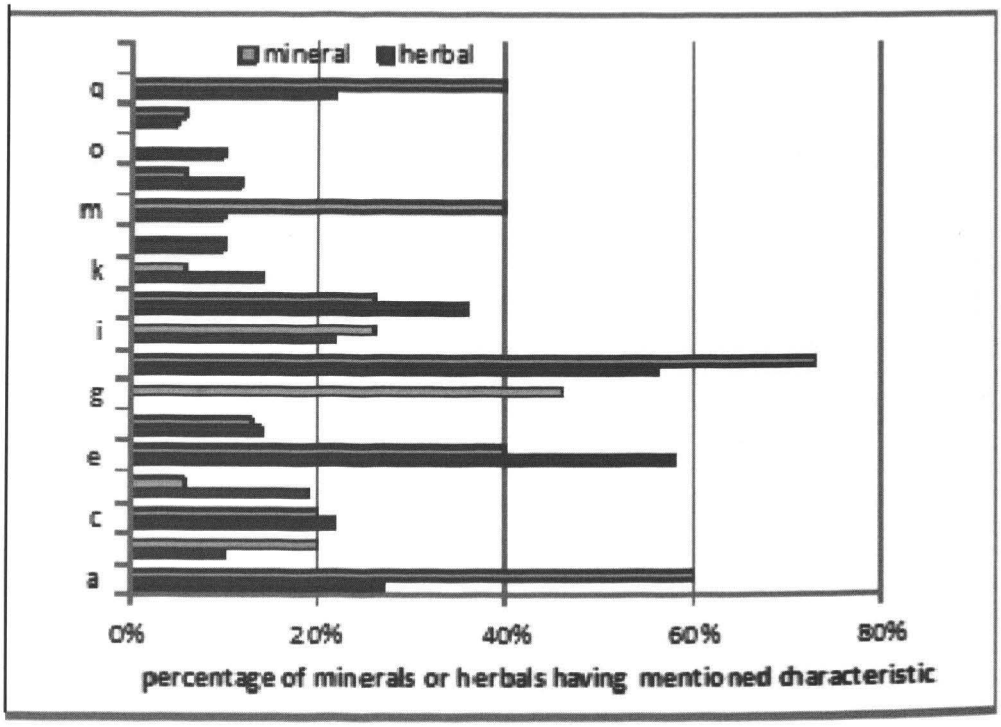

Figure 1: Ancient knowledge about burn wound healing (usage of herbal and mineral according their characteristics). The statistics are based on data in Tables 1 and 2. *a: anti-bleeding*; *b: anti-blistering*; *c: anti-infection*; *d: anti-inflammation*; *e: astringent; f: attenuant*; *g: debridement*; *h: desiccant*; *i: detergent*; *j: discutient*; *k: maturant*; *l: pain calmative*; *m: promote healing*; *n: refrigerant*; *o: softener*; *p: tissue adhesive*; *q: tissue expander*.
For example 60% of all introduced minerals have anti-bleeding effect, while 27% of herbals show this characteristic.

Discussion and conclusion

This study, using extracts from ancient Persian manuscripts, proves that these works have been written by physicians qualified in wound healing. They were experienced in selecting suitable healing agents according to the source or cause and depth of burn wounds. More than 60 plants and minerals have been suggested that work through different mechanisms. The majority of recent articles supported this knowledge. The extract of *Lawsonia* leaf inhibits the growth of micro-organisms, and fresh crude extract of *Portulaca* results in collagen fibre formation, so both of them accelerate the healing process.[19-20] *Boswellia* resin has anti-inflammatory and antimicrobial effects which indirectly improve wound healing.[21] Despite these and other convincing reports, many of the therapeutic agents mentioned have not been studied yet. Such data can be the first step in new drugs design through *in vivo* and *in vitro* researches. In the case of minerals, their toxicity may cause concern, but various methods of detoxification have been addressed in manuscripts which can be evaluated through modern chemical methods.

Minerals are more efficient in tissue adhesion and expansion, bleeding control and debridement, according to Figure 1; therefore the majority of compound formulations were made with them and they are capable of healing severe and deep wounds.

Herbal formulations are suggested for mild and superficial burn wounds.

Although this review portrays the glory of pharmaceutical knowledge in ancient Persia, some practical aspects could be beneficial for people worldwide.

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Endnotes and References

1. Sarton G. *A History of Science*. Translated by Ahmad Aram. Cambridge: Harvard University Press, 1952.
2. Khalil EA, Afifi FU, Al-Hussaini M. Evaluation of the wound healing effect of some Jordanian traditional plants formulated in Pluronic F127 using mice (*Mus musculus*). *J Ethnopharmacol* 2007; 109 (1): 104-12.
3. Kopp J, Wang GY, Horch RE, Pallua N, Ge SD. Ancient traditional Chinese medicine in burn treatment: a historical review. *Burns* 2003; 29: 473-8.
4. Kumar B, Vijayakumar M, Govindarajan R. Ethnopharmacological approaches to wound healing - Exploring medicinal plants of India. *J Ethnopharmacol* 2007; 114 (2): 103-13.
5. Aboelsoud NH. Herbal medicine in ancient Egypt. *Journal of Medicinal Plants Research* 2010; 4 (2): 82-6.
6. Watkins F, Pendry B, Sanchez-Medina A. Antimicrobial assays of three native British plants used in Anglo-Saxon medicine for wound healing formulations in 10th century England. *J Ethnopharmacol*. 2012; 144: 408-15.
7. Patwardhan B. Ethnopharmacology and drug discovery. *J Ethnopharmacol* 2005; 100: 50-2.
8. Aghili Shirazi SMHIMH. *Makhzan al Advieh*, (rewritten by Rahimi R, Shams Ardekani MR), Tehran: Rah-e Kamal Press, 1st edn, 2008.
9. Tonekaboni M. *Tohfat al moeminin* 1670, (rewritten by Rahimi R, Shams Ardekani MR) Tehran: Shahr Press, 1st edn, 2007.
10. Aghili Shirazi SMHIMH. *Qarabadin Kabir*, 1772 AD, Edition Litograph, 1855.
11. Ghaeni Heravi MS. *Qarabadin Salehi*, 1766 AD, (rewritten by Badr P, Mohagheghzadeh A, Shams Ardekani MR), Tehran: Rah-e Kamal, 1st edn, 2013.
12. Arzani MA, *Tibb Akbari*, rewritten by Natural Medicine Institute, Qom: Institute for study of medical history, Islamic and Complementary medicine,1st edn, 2008.
13. Kermani HNIA, *Sharh al-Asbab va al-Alamat*, 1428 AD, translated into Persian by Al-Hosaini HSAIM, 1830 AD. Tehran: Institute for study of medical history, Islamic and Complementary medicine, 2009, 543-553.
14. Razi MZ, *Kitab al-Asrar*, translated by Sheibani HA. Tehran: Tehran university publication, 1992, 490-555.
15. Ibn al-Nafis. *Al-Mujaz fi al-Tibb* (translated into Persian by Emami A, Javadi B). Tehran: Tehran university of medical sciences, 2012, 247-277.
16. Abu Raihan Biruni, *Ketab al-saydana fi-al-tibb*, *ca* 1045, translated into Persian by Mozaffarzade B. Tehran, Iranian Academy of Persian Language and Literature, 1st edn, 2004.
17. Hooper D. *Useful plants and drugs of Iran and Iraq*, 1937 AD. Tehran: Institute for study of medical history, Islamic and Complementary medicine, 1st edn, 2002.
18. Guo S, Dipietro LA. Factors Affecting Wound Healing. *J Dent Res* 2010; 89 (3): 219-229.
19. Cohen BJ. *Medical terminology*, 6th edn. Philadelphia: Wolters Kluwer, 2011, 508-513.
20. Nayak B, Isitor G, Davis EM, GK Pillai. The Evidence- based Wound Healing Activity of *Lawsonia inermis* Linn. *Phytother Res* 2007; 21: 827-831.
21. Rashed AN, Affinia FU, Disi AM. Simple evaluation of the wound healing activity of a crude extract of *Portulaca oleracea* L. (growing in Jordan) in *Mus musculus* JVI-1. *J Ethnopharmacol* 2003; 88: 131-136.
22. Moussaieff A, Mechoulam R. Boswellia resin: from religious ceremonies to medical uses; a review of in-vitro, in-vivo and clinical trials. *J Pharmacy Pharmacology* 2009; 61: 1281-1293.
23. Avicenna. *Canon of Medicine*, (translated into English), New Delhi, India: Hamdard Printing Press, 1998.

The Pars Collection: a window into the past

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A recent study that sought a 'missing' history of drug-taking during the early twentieth century involved the analysis of some volumes from the Pars Collection. The Pars Collection is a complete set of prescription books from a pharmacy that traded as Pars and Co. Ltd. in Bournemouth between 1876 and 1978. As familiarity with the content of the volumes grew the value of the prescription books went beyond how many times particular drugs were dispensed on any one day. These books conveyed a 'story' about the customers who visited the shop and through them life in Bournemouth at the turn of the twentieth century. In addition, an unexpected finding was that the evidence from this source could be related to other evidence extracted from *The Times* regarding drug consumption during this period.

Overview of the study

The focus of research was upon people who chose to regularly take drugs in the early twentieth century. This was a group of people likely to have left little trace of their lives for future generations to find. At the turn of the century their self-regulated drug consumption would have drawn little attention, they may have been considered morally weak by others[1] but it was a private matter. However, during the first decades of the twentieth century drug consumption came more to public attention, which resulted in the Defence of the Realm Act (DORA) Regulation 40b. This meant that those who self-regulated their consumption of drugs were from 1916 committing an offence and thus they naturally sought anonymity to avoid prosecution. In essence, the early twentieth century is a key period in the history of drug-taking as effectively the social status of drug-takers was transformed overnight. It was the impact that DORA Regulation 40b had on the lives of drug-takers which was the focus of this study.

However, to discover the experiences of drug-takers living through this period of great change would be a difficult task. It was necessary to think about how other historians had approached topics where there was a scarcity of evidence. A key strategy for this type of research is to look at archive material in different ways or to 'read against the grain'.[2] Hobsbawm[3] highlights how 'reading against the grain' is employed in the practice of grassroots history. He indicates that grassroots historians work from the assumption that records created for one purpose may in fact accidentally have captured information that provides vital insight to another issue. Thus, for grassroots historians sources only emerge as such

> because someone has asked a question and then prospected desperately around for some way – any way – of answering it. … There is generally no material until our questions reveal it. (p271).

In this study, accidental capture was the most likely source of evidence and it was important to consider all the potential sources where accidental capture could have occurred. At the turn of the twentieth century individuals purchased their prescriptions and, as the property of the customer, these could be presented at a pharmacy when the owner chose to. Evidence from articles published in *The Times* during the period indicated that using a purchased prescription repeatedly was one way regular drug-takers obtained their drug of choice. Therefore, prescription books were one option that might help trace regular drug-takers during the early twentieth century.

Prescription books are a rarely used but valuable historical source.[4] They have been used previously to analyse prescribing and professional practice during specific eras.[5] Reading about the content of prescription books raised the question; might this source hold hidden evidence that could be revealed through a different analytical approach?

The starting point for 'prospecting' prescription books was to review what was recorded in these sources and whether there was a standard format. Establishing this would help assess the consistency of the evidence over time and whether it was possible to trace personal consumption during an extended period of time. Prescription books from several archives were reviewed. This process indicated that records rarely extended over a longer period either because volumes were missing or because the condition of the books was too poor to read all the entries. Also there was no standard approach to recording what the pharmacist dispensed. However, when the Pars collection was traced the quality of records stood out as exceptional and thus this source was focused upon by this study.

Another key source used in this study was *The Times* digital archive. From searches of this source 359 articles were identified and included in the study. These articles reported drug-related incidents that occurred between 1900 and 1922. Their content revealed a great richness of evidence and when this was compared to the analysis of Pars prescribing records it was possible to see similarities and links between the evidence provided by the two sources.

Background to Pars and Co Ltd.

In Bournemouth today older people still refer to Pars Corner because the pharmacy was a key landmark within the town. It attracted attention due to its exotic window displays which at the turn of the century included rare items such as natural sponges from the Mediterranean.[6] It also had an unusual frontage which was curved. The shape was due to the shop fittings which dated back to the Regency period. These were transported from London to Bournemouth when the pharmacy first opened in 1876 and the shop front modified to accommodate them. When the shop closed the interior went to the Ironbridge Museum. The 124 prescription books found at the shop were preserved also and sent to the Science Museum

Library, London. Compared to other prescription books considered for inclusion in this study the Pars Collection is outstanding. On a practical level the condition of the volumes used for this study (1890-1922) was very good and the ink entries remain clear and readable. In terms of information the content is very detailed and meticulously recorded. There is also evidence that entries were cross checked and amended when incorrect. In addition, the pharmacist made comments against prescriptions such as 'Do not repeat'; however, on occasions the dispenser did. It is due to the care taken by the staff that these volumes are able to 'speak' about life during the period.

The customers of Pars and Co. Ltd.

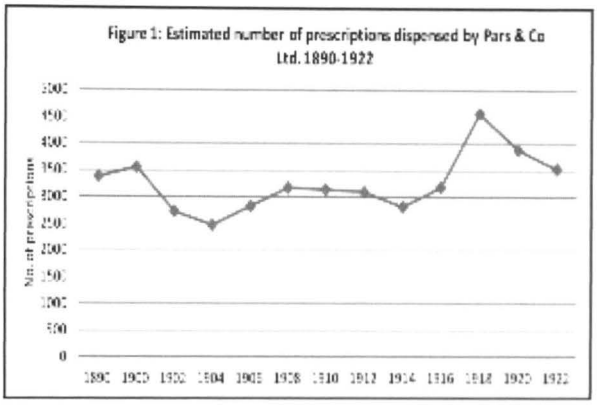
The dispensing of three specific drugs (opium, cocaine and heroin) was focused upon in this study. These drugs were most commonly dispensed to female customers. The entries in the Pars records gave little clue to the background of these female customers but given the profile of the shop they needed to be reasonably affluent. The entries for male customers indicated that there were military connections and searches of UK census records revealed many had served overseas for example, India or South Africa.

The Pars records included the addresses of customers and this gave another clue to their customer base. The entries indicated that a significant number of customers were visitors staying in hotels. Some were regular visitors over the period but many were not. Dispensing to a person unknown to the pharmacist was in breach of the law at the time. However, it appears that this was overcome by dispensed items being collected by hotel staff or local nurses. The recurrence of customers at particular times of year also indicated that the regular visitors came for particular periods, not always in the summer but at other times. Possibly this relates to the mild winter climate of the area.

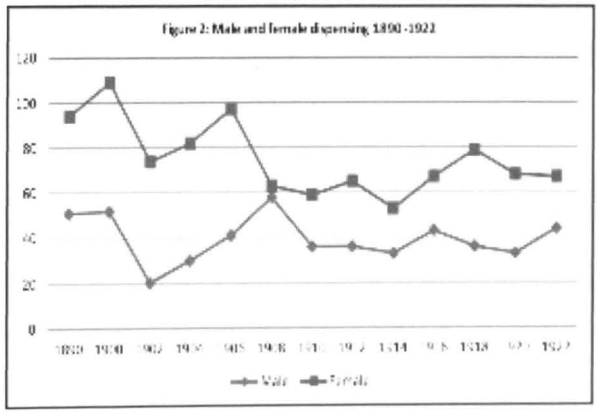
Bournemouth was also associated with the entertainment industry particularly through the Russell-Cotes family who were strong supporters of the arts. The family entertained many theatre stars of the day at their home and their hotel, The Royal Bath. The combination of health benefits, celebrity appeal and excellent rail links to London made Bournemouth a fashionable escape from the capital. As Pars & Co. Ltd was considered to be an 'up-market' retailer it is likely that many of the visitors listed in the shop's prescription books were probably affluent Londoners. It seemed that the records had captured an interesting group that were probably quite affluent and included both residents of Bournemouth and visitors to the town.

Analysis of the Pars Collection

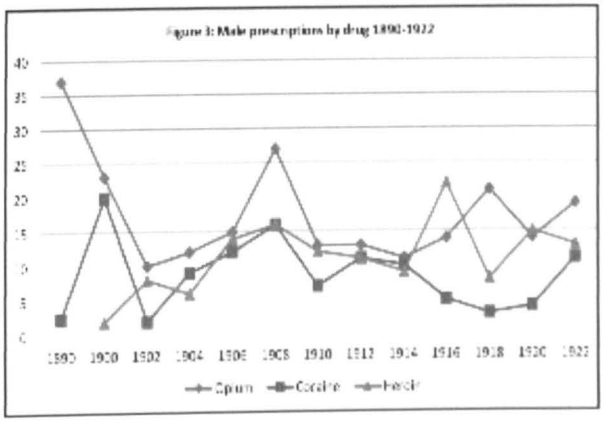
Initially, the study aimed to analyse the Pars Collection by looking at all dispensed prescriptions during 1890 and then alternate years from 1900 until 1922. The records for 1890 were used as a base year from which to look at the trends in prescribing during the later period 1900 to 1922. To look at the level of prescribing during the period the number of pages per year and the average number of entries per page were recorded and used to estimate how many prescriptions the premises dispensed in each year analysed. Figure 1 shows the estimated number of prescriptions dispensed at Pars between 1890 and 1922.

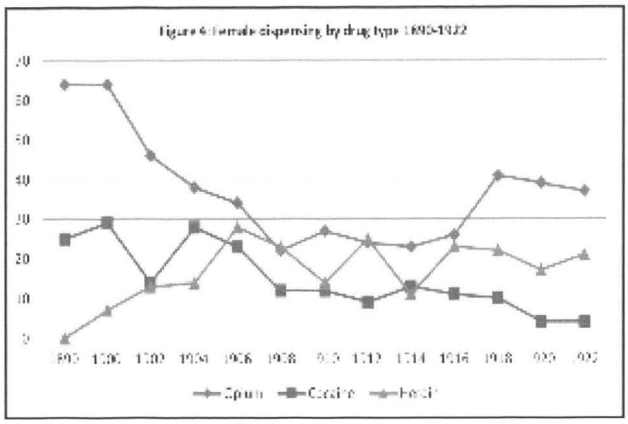


The analysis of the prescription books focused on the dispensing of prescriptions that contained one of three specific drugs, opium, cocaine and heroin.[7] Subsequent analysis of these prescriptions showed that female customers were much more likely to be dispensed these drugs in most years with the exception of 1908 when male dispensing almost matched that of female customers (see Figure 2).



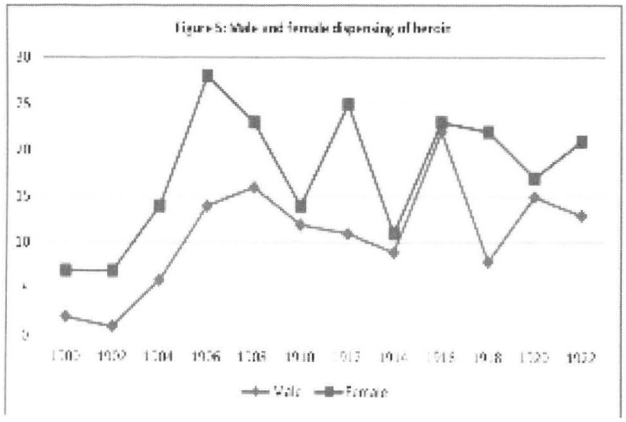
From comparing dispensing trends by gender the male peak in 1908 occurs when dispensing to females is also falling. The reduction in female dispensing begins in 1904 with a decline in prescriptions containing cocaine and then in 1906 there is also a fall in both opium and heroin. However, among male customers there is the





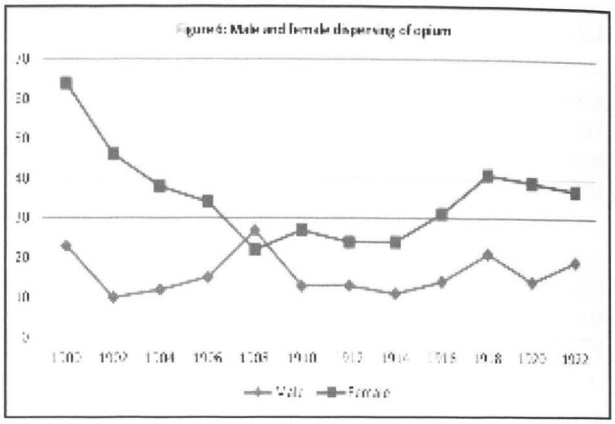
reverse trend. Dispensing to male customers of opium rose from 1902 and then increased very sharply after 1906 while cocaine rose from 1902 and heroin from 1904. A key question was therefore: why was male prescribing the converse of female trends within that period? Figures 3 and 4 show Pars dispensing by drug type for males and females over the period.

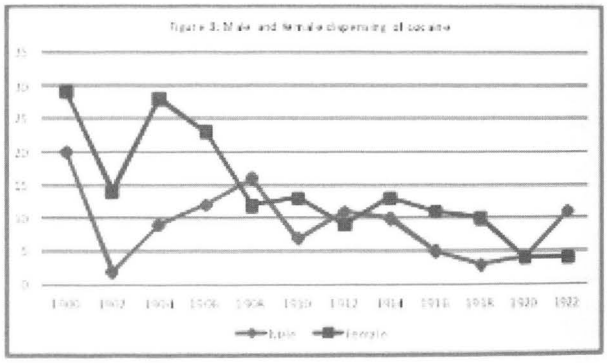
Marked variation in dispensing by gender seen in Figures 3 and 4 raises the question: why should there be such trends? The probability is that people with similar conditions should receive similar medications, so prescribing should likewise be similar. It seems unlikely that within the same period that males and females living in Bournemouth had completely different conditions or illness that would require totally different prescribing patterns. The most interesting pattern appears in the prescribing of heroin (see Figure 5).



When looking at Figure 5 the context is relevant. Heroin had only recently come on the market (1898) and the period shown includes the First World War when the population would have been significantly altered with the enlistment of younger males. There may also have been problems with the supply of drugs due to wartime sea blockades[8] which could have influenced prescribing. Figures 6 and 7 show the dispensing by gender for opium and cocaine over the same period.

A feature across all the drug types is the trend during the war. During this period customers of Pars and Co Ltd. were likely to have been either female or older males. The pattern of dispensing which occurs within this period suggests that either females and older males take similar drugs or the supply of drugs impacted upon what could





be dispensed. Several features make the first assumption quite plausible. Across the data it is possible using the evidence from *The Times* to see points where dispensing behaviour fits with reaction to events that relate to either females or younger males.

As the customers of Pars would have purchased their own prescriptions and paid for consultations with their doctor there is the possibility that they did have some influence over what they received. Looking first at female dispensing; the sharp decline in cocaine dispensing in 1902 could be a reaction to incidents during 1901 and 1902 involving cocaine and females. During July 1901 the deaths of two well-known actresses occurred. Each died from an overdose of cocaine.[9] The second incident in early 1902 was a civil case involving a regular female drug-taker who took a range of drugs including cocaine.[10] Her state of health was very poor at the time of the trial and her family had her declared insane to place her in treatment. The case was extensively reported in *The Times*. In addition from 1906 there is a fall in all female dispensing across all drugs. This fall coincides with the sale of the first barbiturate, Veronal [barbitone] marketed in 1906.[11] This was, in 1906, an unrestricted drug that could be bought without prescription. Given that the pattern of female dispensing for heroin when it was first marketed it is possible that females were switching in 1906 to Veronal, the new 'trendy' drug. Modern research indicates that female drug consumers are much more sensitive to market change than males.[12] Therefore, this movement from one drug to another would fit with female behaviour. Also, the larger study of which this piece of research is one part found that female drug-takers were more risk avoidant. As Veronal was a non-restricted drug it meant that any purchases would go

unrecorded, which would be preferred by female customers, and thus provide another reason why females might have switched from heroin to Veronal.

Lastly, in terms of female dispensing patterns, during December 1918 a very prominent female actress died, allegedly from a cocaine overdose.[13] Again in the Pars dispensing records there is a fall in the number of females receiving prescriptions containing cocaine. From the legal proceedings after the actress's death, evidence suggests that she also took heroin and had started doing so sometime in mid-1918. Other reports of heroin-taking suggest that heroin consumption may have become more common among female drug-takers from around 1918. This female preference seems to continue into the 1920s. This is a female trend mirrored in the Pars records.

Looking at male dispensing, their professional background could hold a clue as the entries in the prescription books suggested some male customers had a military background, with many having served overseas. Therefore, one theory on the rise in male prescriptions after 1902 is that these males were veterans returning from the Boer War. Possibly they were settling in the town because of its promotion as a health resort or maybe they were visiting on holiday. Articles from *The Times* indicate that some veterans from this conflict had become dependent consumers of drugs while on active service in South Africa. Drug-taking veterans of the Boer War were noted in reports until around 1912. Many were associated with morphine and some cocaine. Morphine cannot be traced in the Pars records, but a likely substitute drug for morphine would be opium, the dispensing of which is rising from 1902. Therefore, rising male dispensing at the shop could be a reflection of a trend for drug-taking among returning Boer war veterans.

In addition, the theory of a link between conflict and male drug-taking fits with other dispensing data from the shop. This shows that male dispensing rose again after 1918, which coincided with demobilisation. In this period, there is also a sharp rise in prescriptions issued to males that contain cocaine or heroin. Again, evidence from *The Times* links First World War veterans to drug dependency, mainly cocaine but occasionally heroin. However, the reporting in *The Times* during the early 1920s strongly associated younger males with cocaine, and the sharp rise in Pars dispensing of cocaine to males would fit this pattern.

On balance the way that trends could be linked to events within the period both for males and females does seem to suggest that the customers of Pars did appear to have some influence over the drugs they accessed. Whether this influence was due to some people self-regulating their drug consumption either occasionally or on a regular basis can only be speculation. However, the regular appearance of some names for repeat prescriptions does point in this direction.

Conclusions

When the analysis of the Pars collection began it was unclear what would emerge; the process was very much about 'prospecting' around for traces of drug-takers. Given the period and the potential control the public still had over their drug consumption, pharmacy records seemed a potential source for accidental capture of regular drug-takers. However, exploring the Pars Collection revealed much more, some of which was unexpected. The process of discovering a 'missing history' highlighted how important it was to set these records back into the period in which they were created, not just considering the legal context but the wider social elements of day-to-day life. The process also demonstrated how the findings reached may not exactly correspond to the initial questions set but that continued questioning or 'reading against the grain' during the analysis is very important to the outcome of the research.

If there is constant questioning, then as this study shows, the content of pharmacy records can go far beyond professional practice. So prescription books should not be seen as lone sources but important pieces of evidence that when connected to other very different sources can help reveal much more about the public's consumption of drugs.

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Endnotes and References

1. Davenport-Hines R. *The Pursuit of oblivion: A social history of drugs.* London: Phoenix Press, 2002.
2. Evans R. *In defence of history.* London: Granta, 1997.
3. Hobsbawm E. *On history.* London: Time Warner Book Group UK, 2005.
4. Anderson S. and Homan C. Prescription books as historical sources. *Pharmaceutical Historian* 1999; 29 (4): 51-54.
5. Anderson S and Berridge V. Opium in 20th Century Britain: pharmacists, regulation and the people. *Addiction* 2000; 95 (1): 23-36.
6. Bournemouth Daily Echo, Chemist's open every day for 103 years closing down. *Bournemouth Daily Echo* 1979 16 May: 5a.
7. Morphine would have been a drug of interest but as it was not included in the Pharmacy Act 1868 and the amended 1908 Act there was not the same necessity to record the sale of this drug.
8. Van Emden R. and Humphries S. *All quiet on the home front: An oral history of life in Britain during the First World War.* London: Headline Book Publishing, 2003.
9. The Times. Inquests. *The Times* 1901; 20 July: 7f.
10. The Times. Law Report. *The Times* 1902; 26 February: 3d.
11. Parssinen TM. *Secret passions, secret remedies: narcotic drugs in British society 1820-1930.* Manchester: Manchester University Press, 1983.
12. Pacula RL. Women and substance use: Are women less susceptible to addiction? *American Economic Review* 1997; 87(2): 454-459.
13. The Times. Miss Carleton's death 'Doping' parties in flats. *The Times* 1918; 13 December: 3c.

Armenian Bole: a historical medicinal clay

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The medical use of earths and minerals is probably as old as the history of mankind. Particular types of clays and earths are still being used worldwide as therapeutic agents in the folk medicine of different countries. From the 19th century, the medicaments included in countries' pharmacopeias whose exact pharmacological activity or the chemistry of their active components was not known gradually decreased in number, despite their popularity among patients. With today's analytical armamentarium it may be time to reconsider returning some of those compounds to pharmacopeias. By using modern techniques in the past two decades, researchers have studied the active components of healing clays and their pharmacological properties. Many of them possess valuable therapeutic properties which could be used in modern medicine in pharmaceutical dosage forms. Our knowledge about the medical substances that our ancestors used through centuries could be used today as an evidence base for further clinical and pharmacological research.

One of these substances is Armenian bole. In this work we studied the historical perspective of its therapeutic use in different countries. Also a sample sold in the market in Iran was purchased and X-ray diffraction analysis was performed on it to find out its chemical composition.

Introduction

From the 19th century until today one can observe that the number of substances in the pharmacopeias that have marked pharmacological properties and known active components has increased. On the other hand despite their popular use the number of substances and galenical compounds whose pharmacological actions were not understood at the time decreased in pharmacopeias.[1] Today with the advances of analytical techniques maybe it is possible to revise our traditional knowledge and bring the forgotten medicaments which were once popular back to our pharmacopeias. A group of these substances are medicinal clays and earths.

The use of minerals for medicinal purposes dates back to prehistoric times. The first report of the use of medicinal earths and minerals goes back to ancient Mesopotamia (2000-3000 BC). The use of these substances could be traced in medical documents throughout the history of different great civilisations such as China, Egypt, Persia and Greece.[2] Dioscorides (first century CE), mentions 99 inorganic substances in his Materia Medica book which is 10% of the number of substances he listed in this book. Hippocrates (4-5th century BCE) mentions nine minerals in his writings as medicaments.[3] Medicinal earths have been categorised in the books of medieval Muslim and Iranian scholars.[4] In the medical books of Ibn al-Sina [Avicenna] such as his *Canon* (980-1037 CE), the pharmacological action of several clays and minerals are explained.[5] Also Rhazes (865-925 CE) mentioned medical clays in his books such as *Al-havi*. He wrote a book about the use of different clays and mud known in Latin as *Dissertatio quod Lutum translatum Contineat Utilitates*.[6] The Muslim Andalusian scientist Ibn al-Baitar (1197-1248) mentions eight kinds of medicinal earths, including Armenian earth (Armenian bole), which was considered as a medicament administered both externally and internally.[4]

Medicinal use of Armenian bole through history

The medicinal use of Armenian bole (also known as Bolus Armenus) could be traced back to Ancient Greece. This famous medicament is described as the red clay found in the mountain caves of ancient Armenia.[2] This earth also was found abundantly in Persia. It was brought from the Persian Gulf to India, where the local practitioners prescribed it as an astringent and to balance the state of the four humours of the body in cases of malignant fever.[4] It is a soft clay, greasy to the touch, strongly adhering to the tongue and very fragile. Armenian bole usually has a yellowish brown color, and sometimes a fine flesh red [4].

In the *Canon* of Ibn al-Sina [Avicenna], the Iranian scholar of the 11th century, the so called 'Tin e Armani' or red Armenian bole is considered as a well known bole which is somewhat dusty and red in colour. It was used by the jewellers to impart colour to gold. As for its medical properties it was said to be a styptic drug and this would give it a highly desiccant property. The oral intake or the topical application of it on the affected part was considered useful in cases of plague. It also states in the *Canon* that Armenian bole prevents the spreading of organic putrefaction and that Red Armenian bole has a wonderful (healing) effect on wounds and ulcers. It was used to treat catarrh and was considered useful in stomatitis. Ibn al-Sina also used Armenian bole in the treatment of haemoptysis and also to dry up pulmonary ulcers. He also wrote in the *Canon* that this clay was a remedy for dyspnoea caused by catarrh. It was also used in case of intestinal ulcers and diarrhoea.[5] In his book *Al-Havi* or The *Liber Continens*, Rhazes has written that this earth in some cases can be used to cure tuberculosis and that this earth is an excellent remedy for wet wounds.[7] In many traditional pharmaceutical Iranian text books a monograph about Armenian bole could be found (Figure1).

Figure 1. Page of an 18th century Iranian book (*Makhzan al-Adviyeh*) which contains part of a monograph on Armenian bole.

Ottoman physicians knew this earth as an exotic and expensive medicine.[3] Armenian bole was used in European medical formulations as well. An example is a prescribed powder owned by William Hill of Ormskirk, Lancashire in the eighteenth century. This formulation was used to prevent rabies in cases of dog bites. At the time 'The Ormskirk Medicine' was a famous remedy in many parts of England. A packet of this formulation is available in the Wellcome Historical Medical Museum. The precise formulation of this preparation was revealed in 1777 by Heysham as: powder of chalk (half an ounce), Armenian bole (three drachms), allum (ten grains), powder of elecampane root (one drachm) and six drops of the oil of anise.[8] Armenian soil was one of the substances mentioned by the Swiss physician Titus Tobler in the mid nineteenth century as a medicament.[3] The pharmacopoeia which contained the at the time so-called out-of-the-way remedies until 1895 was the *French Codex*. One of the formulations in it was the *electuaire theriacal,* which included fifty-eight ingredients, among which was 'terre sigillde' (Armenian bole).[1] Despite its elimination from pharmacopoeias the medical use of Armenian bole in the folk medicine of different cultures has continued. There are documents showing that in the 20th century Armenian bole was used as a therapeutic agent in the Levant region for the treatment of dysentery, bleeding, skin allergies and leishmaniasis.. Today in the folk medicine of Iran this bole is still being sold in the local market for skin disorders.

For this study a sample of Armenian bole was purchased from a local shop in Shiraz and analysed by X-ray Diffraction (XRD) for its chemical composition.

Crystal identifications were performed by an X-ray powder diffraction (XRD) analyser system (Xpert–MPD, Philips, The Netherlands) operating at the Co Ka wavelength of 1.7889A, 30 mA, and 40 kV. Step size was 0.02°/s. Calcite ($CaCO_3$), Quartz (SiO_2), Gypsum ($CaSO_4.2H_2O$), Muscovite ($KAl_2Si_3AlO_{10}(OH)_2$), Dolomite ($CaMg(CO_3)_2$, Haematite (Fe_2O_3) and Chanosite ($Fe_3Si_2O_5(OH)_4$) were found to be the main mineral components of the Armenian bole sample.

Conclusions

Traditional medical books from different countries can provide good information on the lists of drugs of our ancestors and clinical trials through history. Armenian bole is an iron-containing clay which was used historically to treat wounds and ulcers in different countries. Over time it was eliminated form pharmacopoeias because its chemical composition was not known. The last pharmacopoeia which contained Armenian bole was the *French Codex* of the late nineteenth century.[1] Because of advances in analytical methods in the last two decades, researchers have tried to explain the scientific backing for the different properties of earths and clays. Today we know that there are documented cases of healing clays.[9] Their medical effect on wounds is primarily due to their small particle size, so they have a vast surface area and an adsorptive property.[9] On their surface they possess high concentrations of ions. Medieval physicians used Armenian bole to prevent organic putrefaction spreading and to treat wounds and ulcers.[5] In recent years research has shown that iron-rich minerals could be used to treat Buruli ulcer, which is an infectious ulcer caused by *Mycobacterium ulcerans*. Some iron-containing clays have shown antibacterial activity.[10] The Armenian bole sample that we tested contained Haematite which could explain why it was used to treat wounds. Ibn al-Sina used Armenian bole to treat intestinal ulcers and diarrhoea.[5] Today there are studies performed on the beneficial effects of clay minerals in gastrointestinal illnesses. The proposed mechanisms of action for their medicinal effect on GI problems are the adsorption of microbes, viruses, or their toxins, on the surface of the clays. It is also proposed that clays can modify the mucus lining which would reinforce natural defences of the gastric tissue. Other health benefits of clays could be supplying the nutritional minerals (*e.g.* Fe, Cu).[9] Clays have been analysed recently as excipients in anti-tuberculosis solid dosage forms.[11] The use of this clay as an anti-tuberculosis medicament has been reported in the history of various countries. With its known chemical composition research could be performed on its pharmacological activity and the mechanism of action of the healing properties. Also the chemical component responsible for these actions could be determined in future studies. Armenian bole is a good example of the medicinal clays and earths used throughout history in different parts of the world.

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Endnotes and References

1. Leech DJ. The Approaching Revision of the British Pharmacopoeia. *British Medical Journal* 1895; i: 317.
2. Gomes CSF, Hernandez R, Sequeira MC, Silva JBP. Characterization of clays used for medicinal purposes in the archipelago of Cape Verde. *Geochimica Brasiliensis* 2009; 23 (3): 315-331.
3. Lev E. Healing with minerals and inorganic substances: a review of Levantine practice from the Middle Ages to the present. *International Geology Review* 2010; 52 (7-8): 700-725.
4. Laufer B. *Geophagy.* Chicago: Field Museum Press, 1930.

5. Avicenna, ed. *Canon of Medicine*. New Delhi: Jamia Hamdard Printing Press, 1998.
6. Ranking GSA. The Life and Works of Rhazes. In *The Seventeenth International Congress of Medicine*. London, 1913: 237-238.
7. Rhazes, ed. *The Liber Continens*. Vols 20 and 21. Iranian Academy of Medical Science Press: Tehran, 2005.
8. Hunter WR. William Hill and the Ormskirk Medicine. *Medical History* 1968; 12 (3): 294-297.
9. Williams LB et al. Chemical and Mineralogical Characteristics of French Green Clays Used for Healing. *Clays Clay Miner* 2008; 56 (4): 437-452.
10. Haydel SE, Remenih CM, Williams LB. Broad-spectrum in vitro antibacterial activities of clay minerals against antibiotic-susceptible and antibiotic-resistant bacterial pathogens. *Journal of Antimicrobial Chemotherapy* 2008; 61: 353-361.
11. Santos Soares D et al. Characterization of palygorskite clay from Piauí, Brazil and its potential use as excipient for solid dosage forms containing anti-tuberculosis drugs. *Journal of Thermal Analysis and Calorimetry* 2013; 113 (2): 551-558.

Book Review

Views and Reviews 2 By Harkishan Singh

Bangalore, India: Association of Pharmaceutical Teachers of India, 2012, pp. 300 (hardback price r550/-, £5.50).

This is the second compilation of the writings by Harkishan Singh, professor emeritus at Punjab University. Whilst the first compilation brought together articles published between 1954 and 2007, this one brings together contributions published in journals and books during the period 2008 to 2011. The book contains a total of 23 pieces on a range of topics, varying in length between just over a page and thirty-four pages.

Inevitably there is now a significant amount of repetition of material included in Singh's previous volumes. A notable feature of the current one is that, of the twenty-three contributions, no fewer than sixteen are biographies of men (but no women) who have made significant contributions to the development of pharmacy in India. However, virtually all have been the subject of previous works by Singh, appearing in the various volumes of his Builders and Awareness Creators of Modern Pharmacy series. In this volume they occupy the longer chapters and constitute the bulk of the book.

The book nevertheless includes the occasional less familiar contribution. There is an interesting piece on the role of colonial commercial travellers in India, and another on the development of a National Formulary of India (NFI). This was spurred on by publication of the British National Formulary in 1949. The first NFI was published eleven years later, in 1960, with new additions appearing in 1966 and 1979, after which there has been no further revision. Singh provides an illuminating analysis of the reasons for the delay and why no further editions of the NFI have been forthcoming.

Two of the contributions offer an historical perspective on different aspects of pharmacy practice in India. The first, a wide-ranging review which includes pharmacopoeias, the pharmaceutical industry and profiles of pioneers, relates to modern pharmacy in India; the second to pharmaceutical education and pharmacy practice. However, again these largely go over ground covered in much greater depth in his earlier volumes on these topics.

For the most part the book brings together articles that have clearly been the result of meticulous research and analysis. But this compilation also includes the occasional opinion piece from Singh which offers a glimpse into the sometimes murky world of pharmaceutical politics in India; some of his historical pieces are disappointingly short, such as that on pharmaceutical heritage.

The final contribution, and one of the longest, is the text of a lecture Singh gave at a workshop on 'Science in India in the Twentieth Century', sponsored by the Asiatic Society in Kolkata. Its title is 'Pharmaceutical developments during the British period and in independent India.' However, again it largely goes over ground extensively covered by Singh himself elsewhere.

The book ends with an appendix in which Singh provides an abbreviated biography of himself. He lists the positions he has held, the awards and honours he has received, other professional and academic recognitions, his teaching and research experience, his publications, and finally his discovery of a drug. It is perhaps a fitting way to round off a long and productive career.

Stuart Anderson

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